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USCIP Report 780

# UNIVERSITY OF SOUTHERN CALIFORNIA

THE USC - IMAGE PROCESSING INSTITUTE  
DATA BASE

## REVISION 1

by

Ray Schmidt  
Laboratory Manager

Original Issue: October 1976  
Revision #1 Issue: October 1977

Image Processing Institute  
University of Southern California  
University Park  
Los Angeles, California 90007

Sponsored by

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ARPA Order No. 3119

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THE USC - IMAGE PROCESSING INSTITUTE

DATA BASE .

REVISION #1.

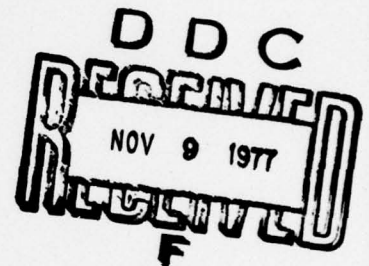
by

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Los Angeles, California 90007



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13. ABSTRACT  This report represents effort expended in attempting to meet the needs of the ARPA-IPTO Image Understanding community in providing the availability of a digital image data base. The data base will never be complete as it is the intention of the USC-IMAGE Processing Institute to update and maintain the base as long as the sponsor and scientific community indicates a need for same. The picture files are individually or collectively accessible either over the ARPANET or via the U.S. mails. For such administrative details, contact:  The Director Image Processing Institute Powell Hall University of Southern California Los Angeles, California 90007			

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Security Classification



**Security Classification**



## Abstract

This report represents the first revision effort expended in attempting to meet the needs of the ARPA-IPTO Image Understanding community in providing the availability of a digital image data base. The data base will never be complete as it is the intention of the USC-Image Processing Institute to update and maintain the base as long as the sponsor and scientific community indicates a need for same. The picture files are individually or collectively accessible either over the ARPANET or via the U.S. mails. For such administrative details, contact:

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## The USC - Image Processing Institute

### Data Base

#### Introduction

The objective of developing the digital picture data base is primarily in support of the DoD - ARPA - IPTO Image Understanding program. The data base is primarily available to this community but will be distributed to other individuals upon request. Naturally no data base is ever complete and we expect this set to expand as time and interest dictate. For those individuals interested in contributing to the base, provisions can be made for inclusion of such imagery.

The organization of the base and character of the imagery included is motivated by the objectives of the Image Understanding program. Various areas of military activity are addressed by this program examples of which include:

Cartography

Surveillance/Reconnaissance

Tactical Cueing

Terminal Guidance

Therefore, an initial suggestion for the organizational structure of the data was parallel to these above areas of military activity. However, this approach soon led to frustration and a new attempt at organization was proposed. Specifically image sensor characteristics were suggested as

a possible organizational method for the data such that the sensor that gathered the imagery would define the category into which such imagery was placed. Typical sensors of interest might include:

- visible monochrome
- visible color
- infrared monochrome
- infrared color
- narrowband multispectral
- forward looking infrared
- side look radar
- synthetic aperture radar
- stereo visible monochrome
- time sequential frames (T.V. movie)
- etc.

As can be seen by this list, the category of sensor can itself become an unnecessarily cumbersome task which does not lend itself to convenient data base categorization.

Finally, a very simple classification method was chosen to avoid categorically limiting the data base due to current military mission and/or state of the art sensor design. This new method of organization is to simply develop a numbering scheme which represents the computer description of the imagery at hand. For simplicity all images are square. If they are monochrome, they are labeled with a "B". If they are color, they are labeled with a "C". If they are part of a motion



picture, they are labeled with an "MP". Typical examples of categories might be:

- a) B1288 - 7
- b) B2566 - 21
- c) B5128 - 3
- d) C5128 - 5

referring to:

- a) monochrome (black and white) 128 x 128 pixels at 8 bits/pixel, file 7.
- b) monochrome (black and white) 256 x 256 pixels at 6 bits/pixel, file 21.
- c) monochrome (black and white) 512 x 512 pixels at 8 bits/pixel, file 3.
- d) color 512 x 512 pixels at 8 bits/pixel, file 5.

Larger data bases (1024 x 1024) are available and are included in this update of this document. Similarly, time (movies and television) sequences have been digitized and are available in this update of this document.

The IPI data base is divided into categories based on the basic characteristics of the pictures. Each category heading reveals the size of the picture (always square), the number of bits of information per pixel, and whether the picture is black and white or color. The following chart identifies the various categories:

B1288	Black & White	128 pixels per record, 128 records per file, 8 bits per pixel
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B2566	Black & White	256 pixels per record, 256 records per file, 6 bits per pixel
C2568	Color	256 pixels per record, 256 records per file, 8 bits per pixel
B5128	Black & White	512 pixels per record, 512 records per file, 8 bits per pixel
C5128	Color	512 pixels per record, 512 records per file, 8 bits per pixel
B10248	Black & White	1024 pixels per record, 1024 records per file, 8 bits per pixel

Copies of the IPI data base are supplied on magnetic tape, 9 track, 800 BPI, on 2400-ft. reels. Each file is terminated by one end-of-file mark, and there are no other marks or headers before or between files. Color pictures are written as three files per picture, each file containing data for the red, green, or blue (in that order) element of the picture. A color picture that this book identifies as file 9 would have the red data on file 7, green on file 8, and blue on file 9.

Data is recorded on tape in binary form. If the pictures are 6 or 8 bit, the pixels will be recorded as consecutive bytes, with no blank bytes between pixels. Thus, a file from the B2566 group would be written as 256 records, each with 256 bytes, followed by an end-of-file mark. The first record read represents the first (top) line of the picture.

This revision of USCIP I Report 710 Data Base includes some time (movie) sequences with a sample of the images available.

represented by the pictures B2568 56 through B2568 63. The first of these images are in reality, frames 1, 16, 32, 48, and 64 of a 76-frame segment of motion picture film. The last three pictures (61, 62, 63) are frames 1, 8, and 16 of a 16-frame segment of motion picture film. Since in both cases, images are sequential motion pictures, the above images were selected as representative. The entire sequence of images are available to those users who desire them. They are identified as MPC 1-16 and MPR 1-76 in the following index of categories. Please note that these images also fall into the B2568 category.

The data in this data base is available in its entirety or by individual categories, such as C2568 only. Random images will not be available as the time and effort involved would be prohibitive. In some instances, data from two categories, i.e. B1288 and B2566 may be combined on one tape.

The index of this updated data base, USCIPI Report 780 Revised, with a magnetic tape requirement, reads as follows:

B1288	90 pictures on 90 files on (1) tape
B2566	26 pictures on 26 files on (1) tape
C2568	18 pictures on 54 files on (1) tape
B2568	63 pictures on 63 files on (1) tape
C5128	36 pictures on 109 files on (3) tapes*
B5128	54 pictures on 54 files on (2) tapes
B10248	9 pictures on 9 files on (1) tape
MPR 1-76	76 pictures on 76 files on (1) tape



MPC 1-16

16 pictures on 16 files on (1) tape

\*Please note: C5128 16 is a multispectral image and therefore  
is recorded on (4) files.

#### Acknowledgements

The Image Processing Institute is pleased to acknowledge  
the enthusiastic support in developing this data base from  
the following individuals.

Mr. Ray Schmidt - Laboratory Manager

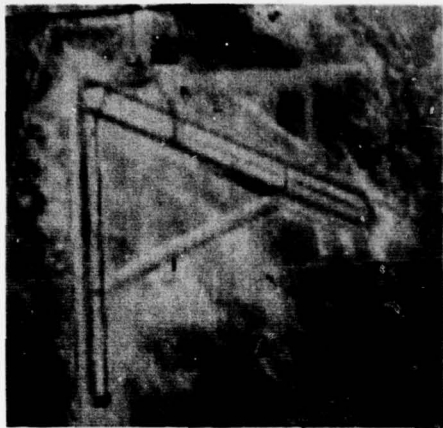
Mr. Behnam Ashjari - Graduate Student

Mr. Gary Edwards - Operator

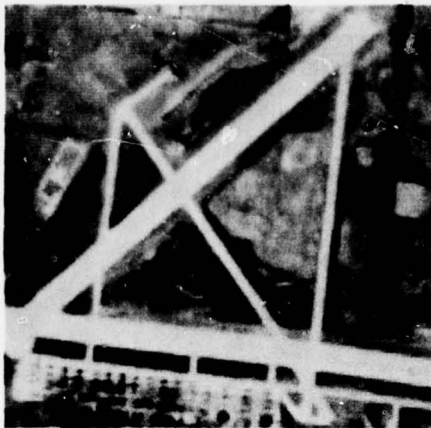
Mr. David Nagai - Photographer

Mr. Clay Olmstead - Operator

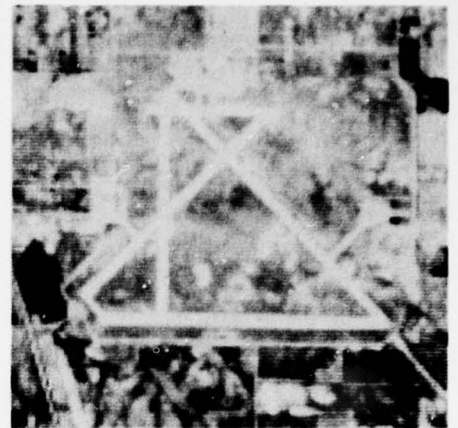
Miss Beverly Sanders - Operator



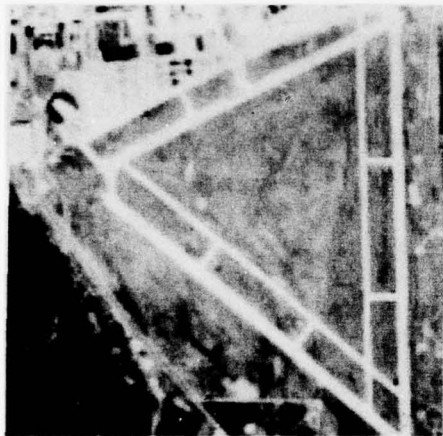
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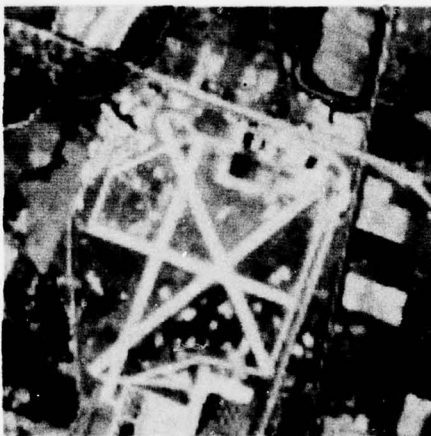
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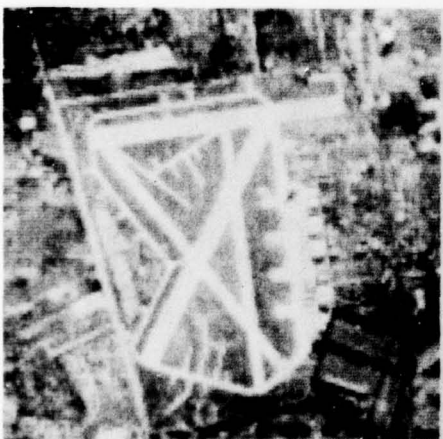
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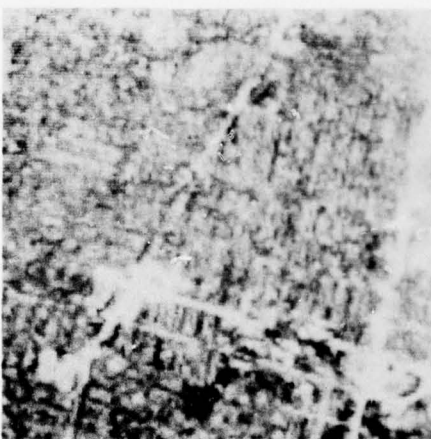
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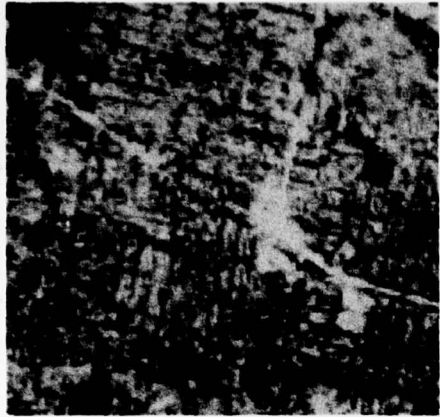
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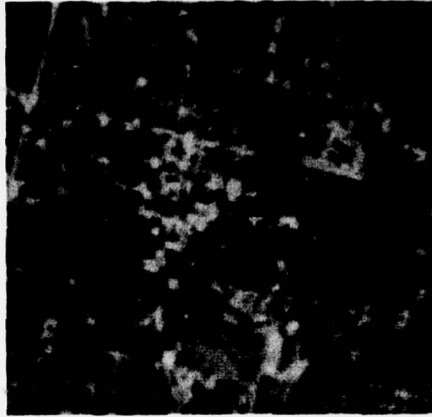
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B1288 9



B1288 10



B1288 11



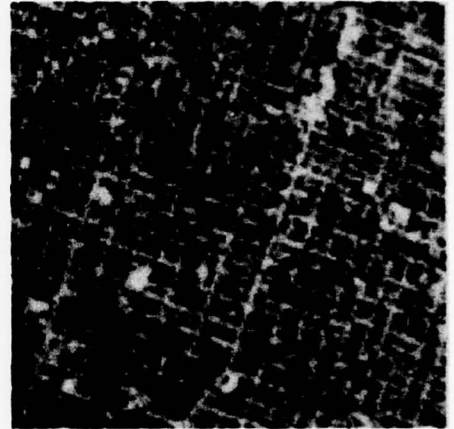
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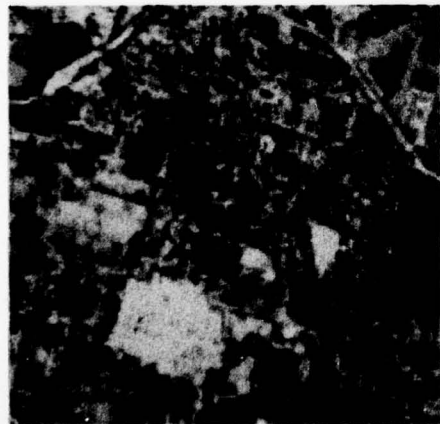
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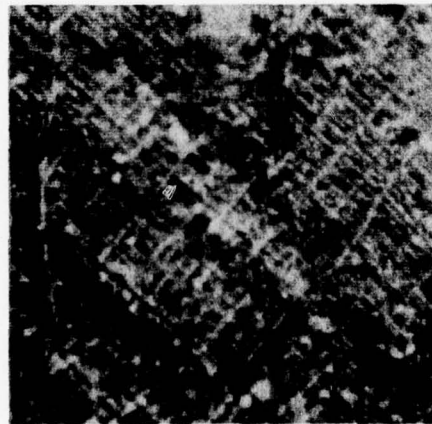
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B1288 16

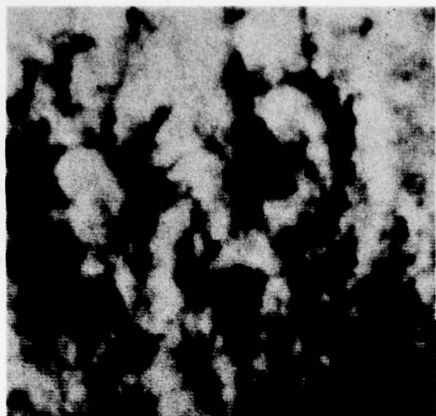


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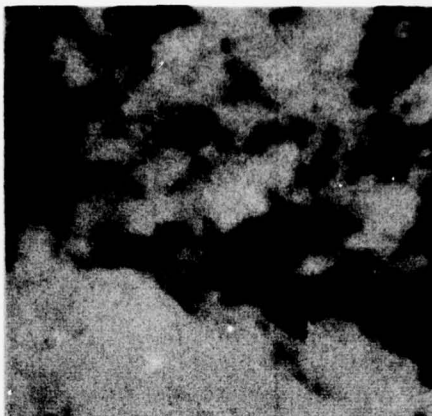


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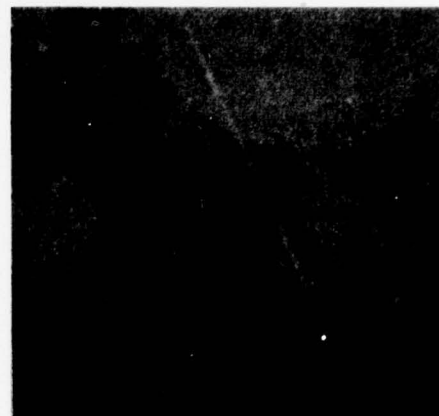




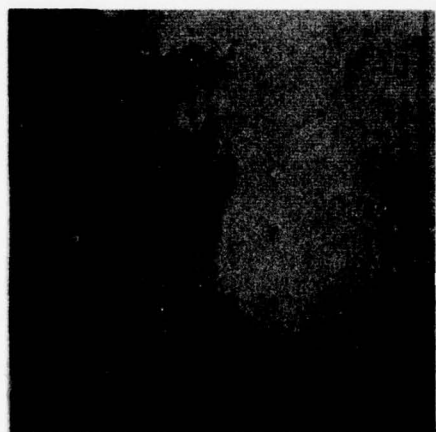
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B1288 21



B1288 22



B1288 23



B1288 24



B1288 25



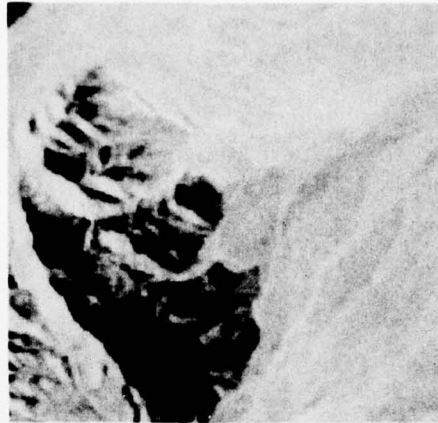
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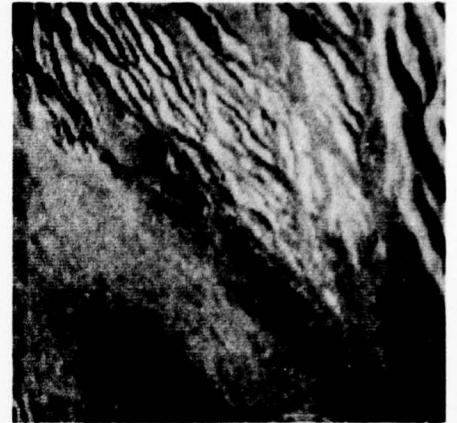
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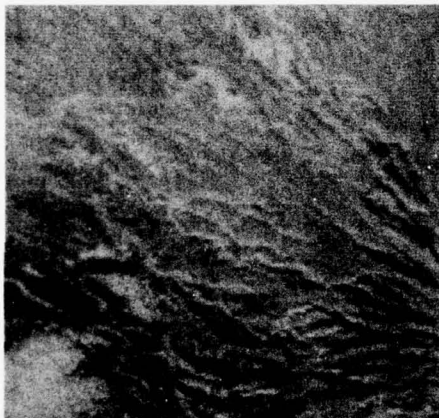
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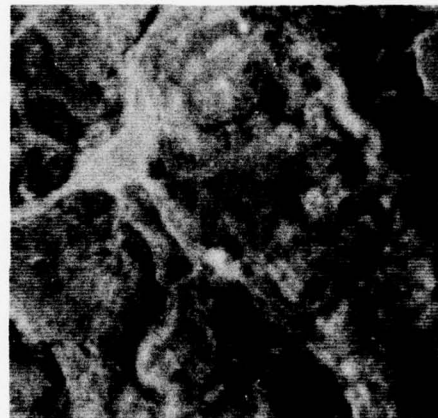
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B1288 31



B1288 32



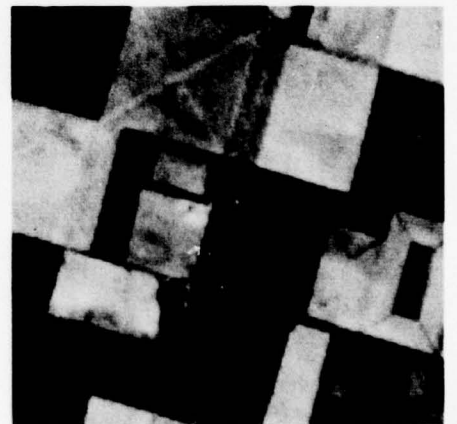
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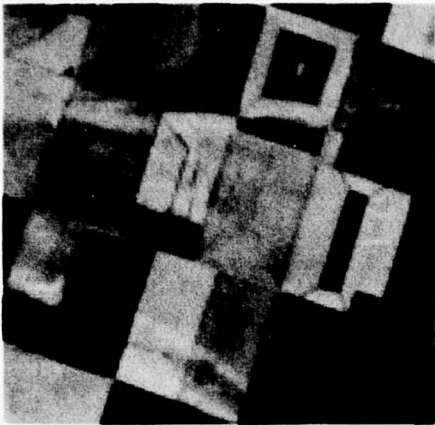
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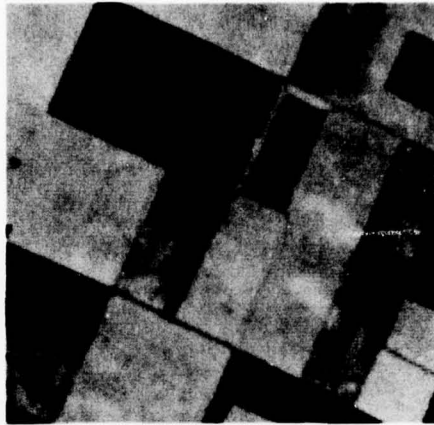
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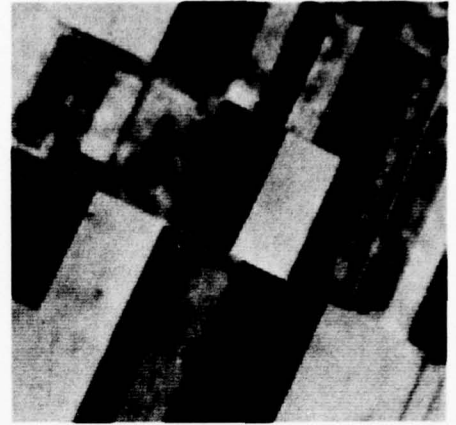
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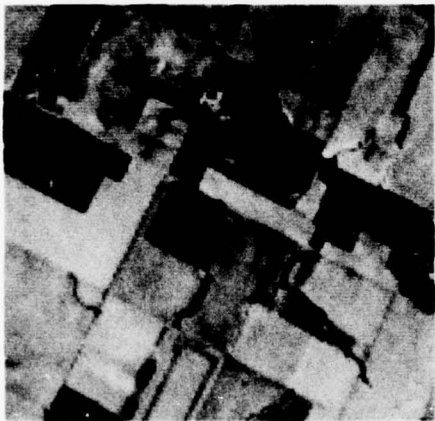
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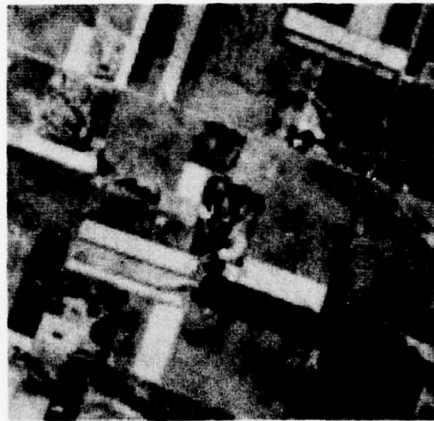
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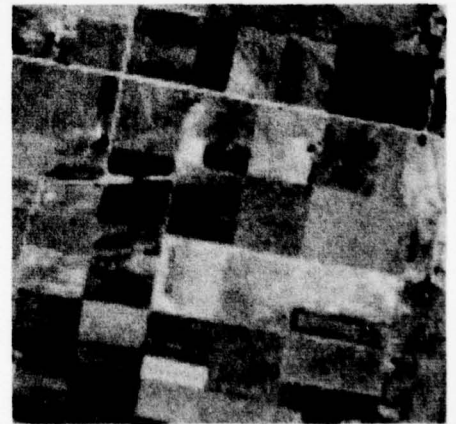
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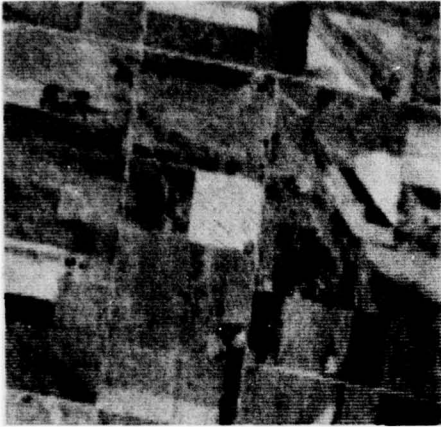


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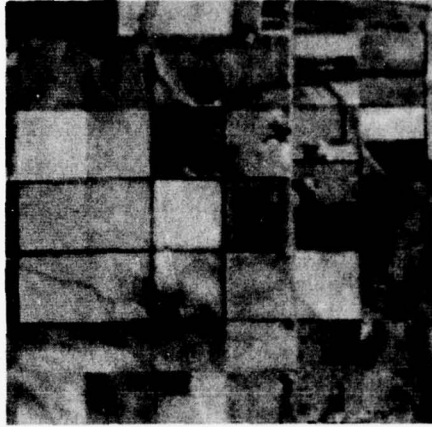


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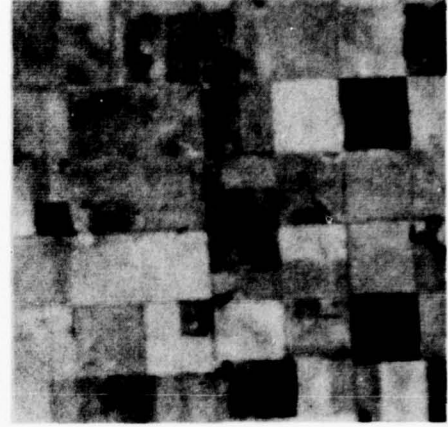




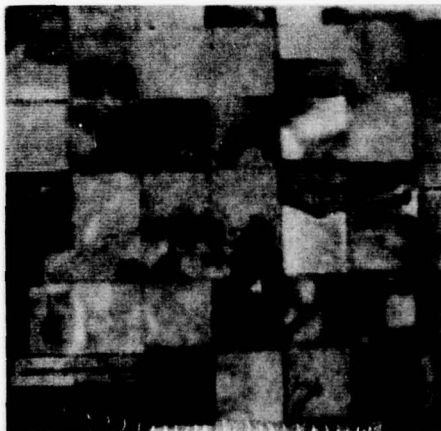
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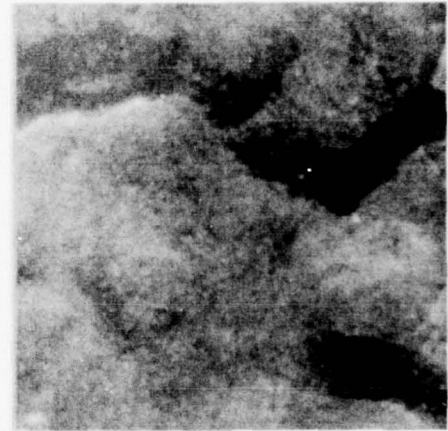
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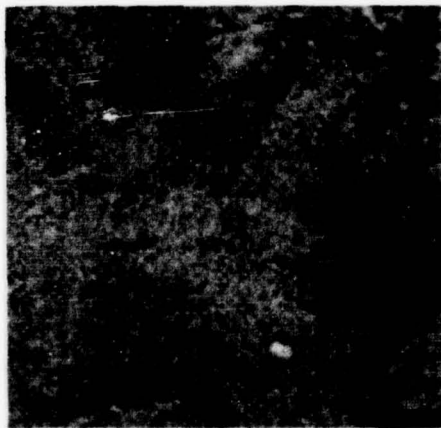
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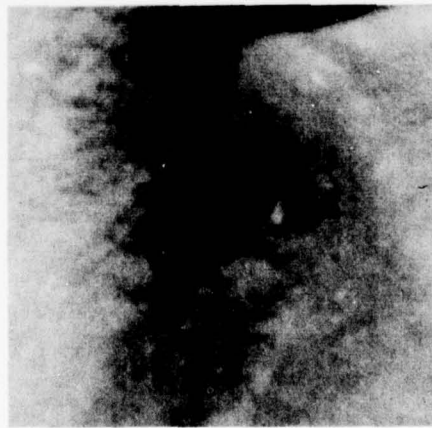
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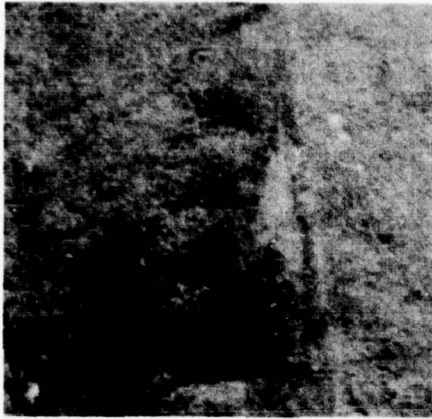
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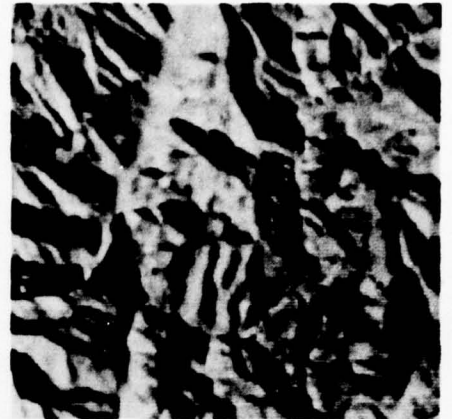
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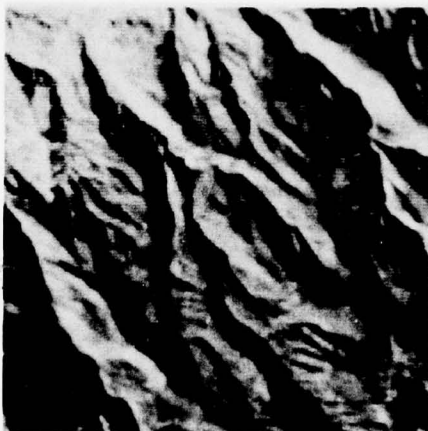
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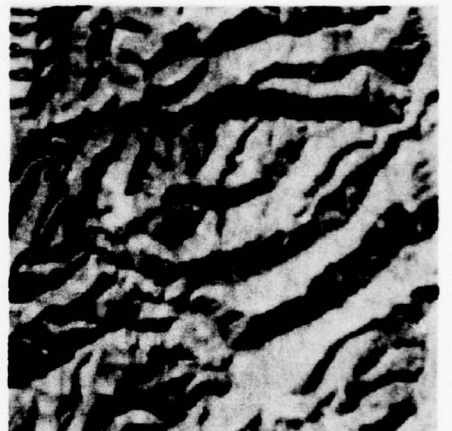
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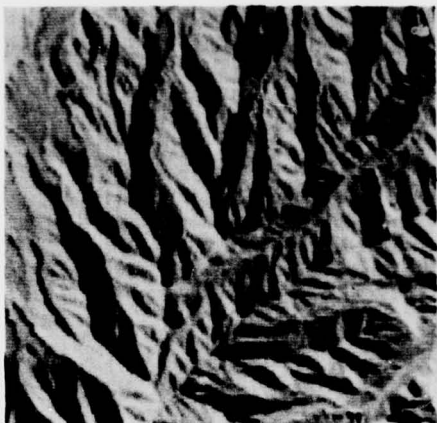
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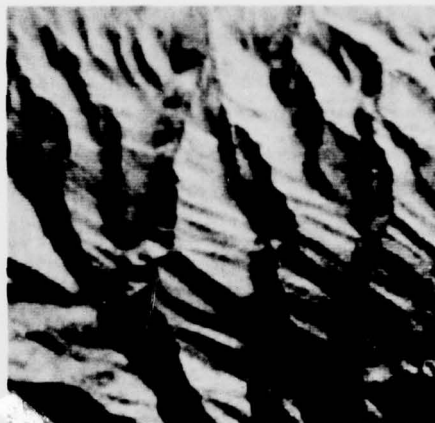
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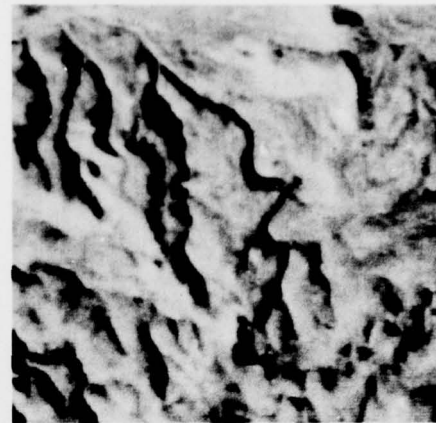
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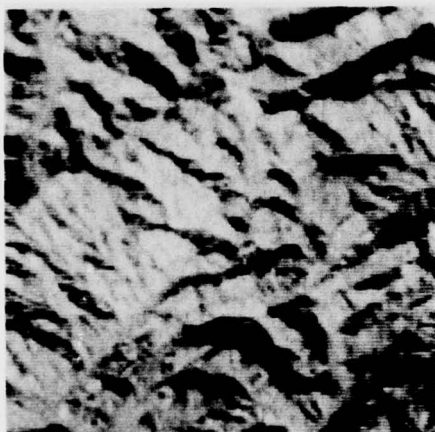
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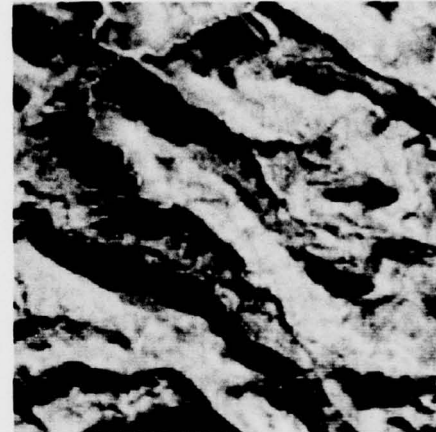
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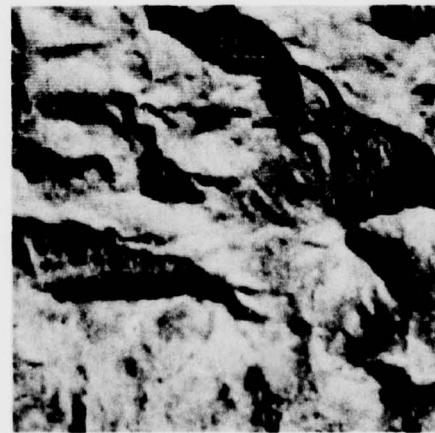
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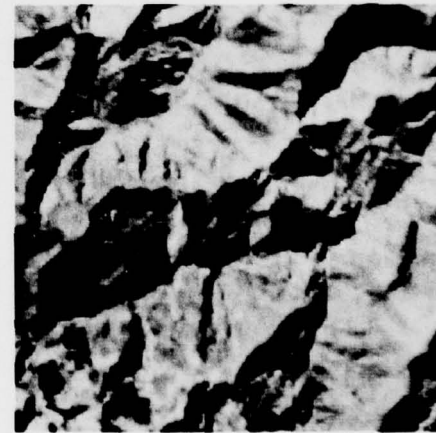
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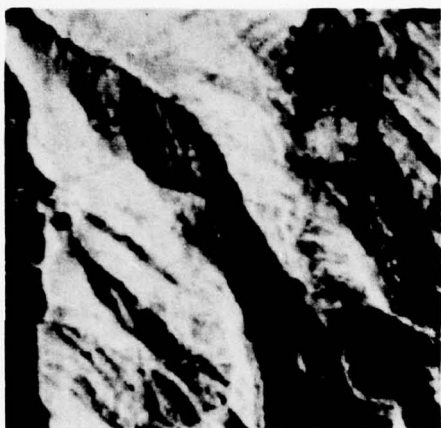


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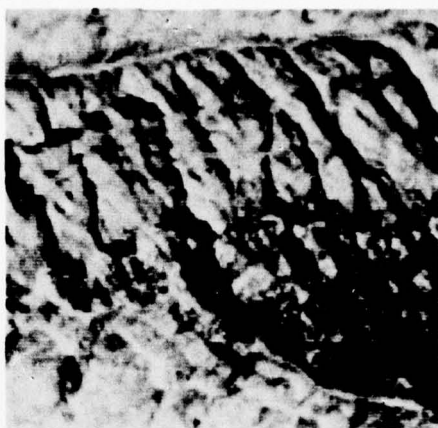


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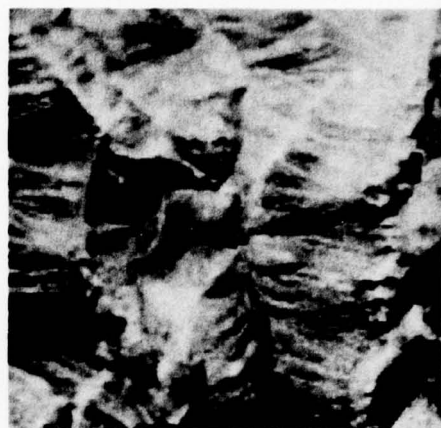




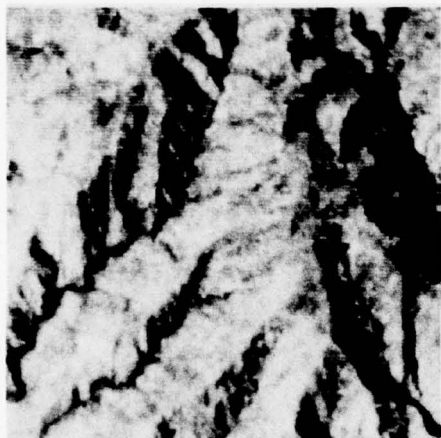
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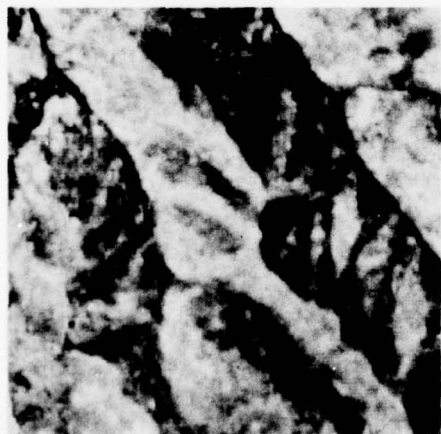
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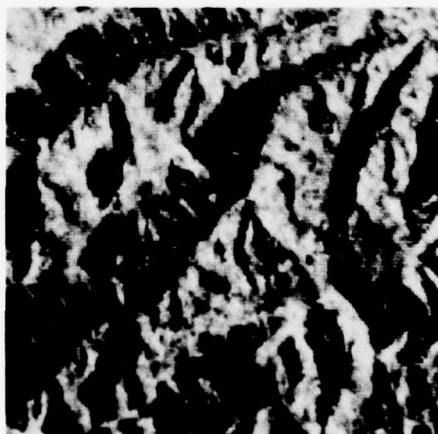
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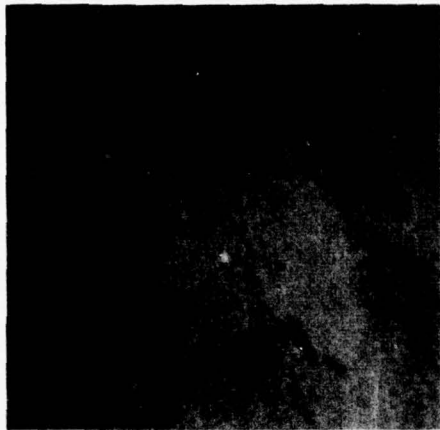
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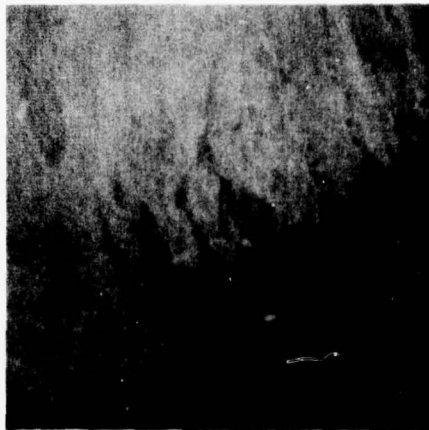
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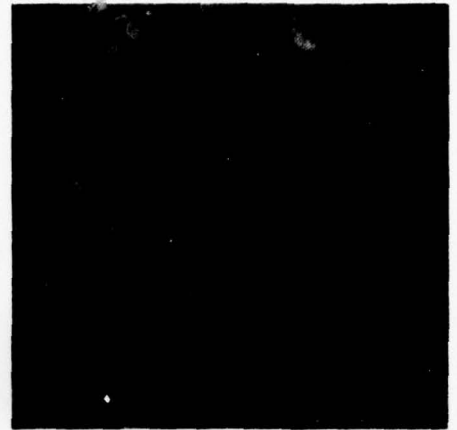
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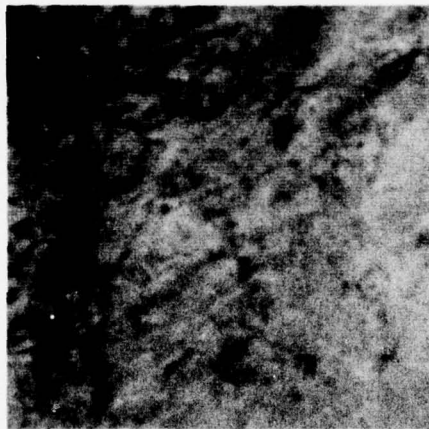
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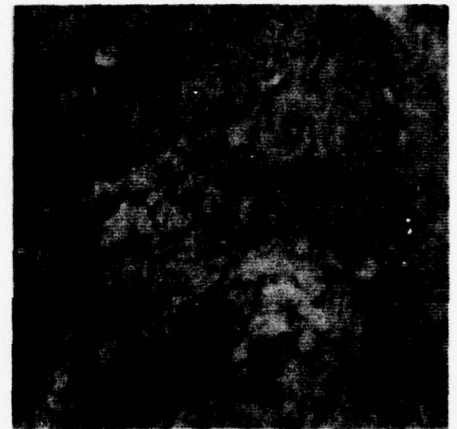
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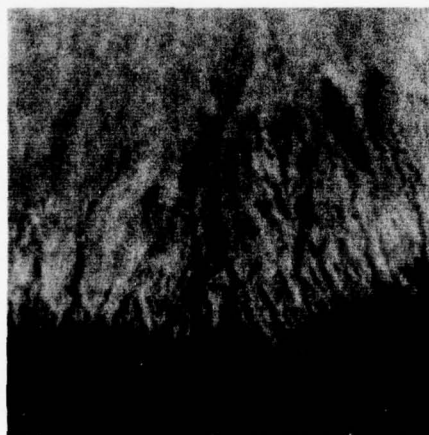
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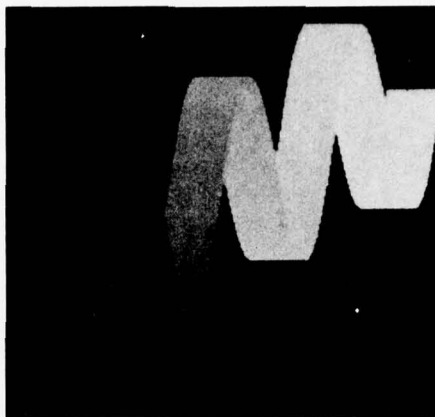
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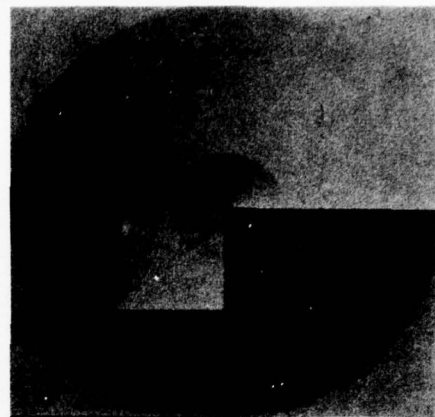
B1288 90



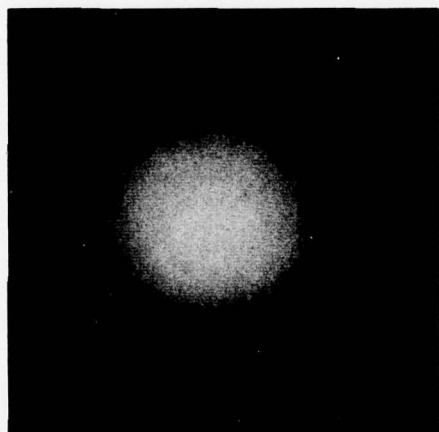
B2566 1



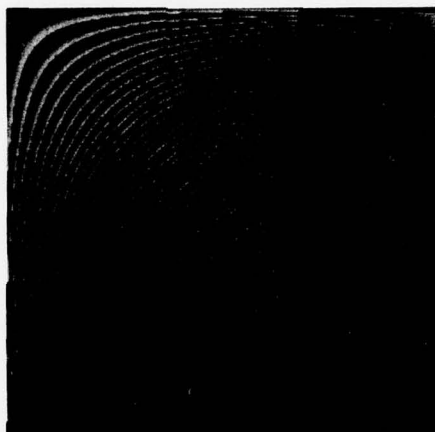
B2566 2



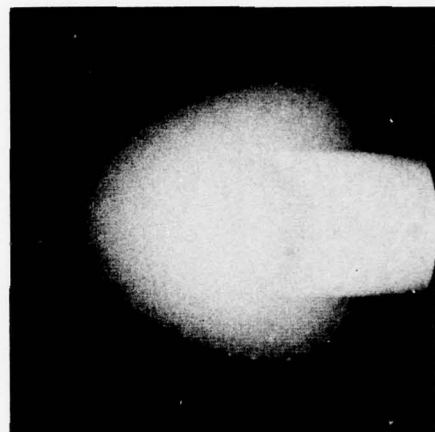
B2566 3



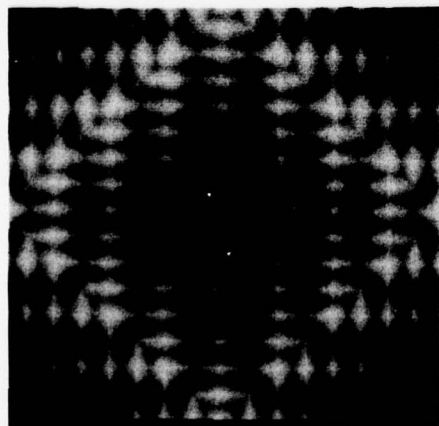
B2566 4



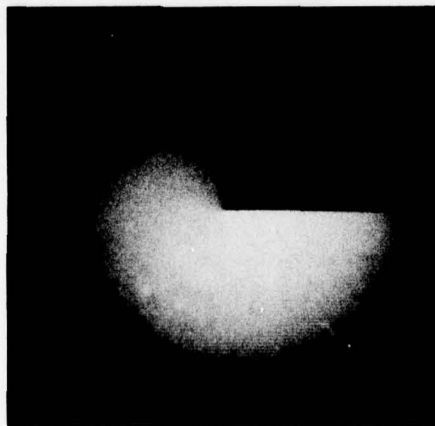
B2566 5



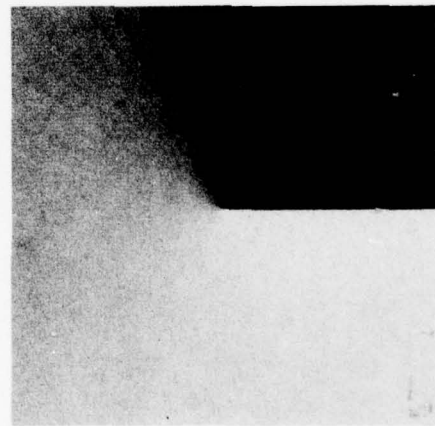
B2566 6



B2566 7



B2566 8



B2566 9





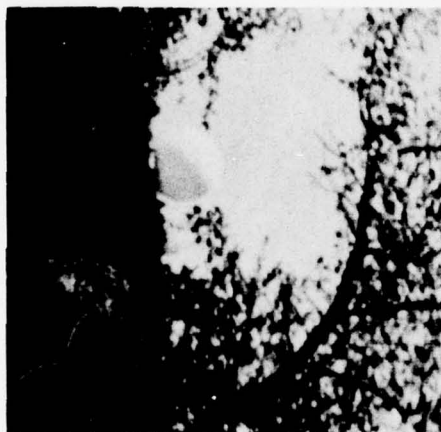
B2566 10



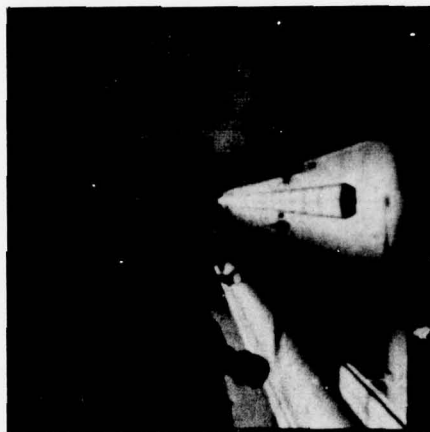
B2566 11



B2566 12



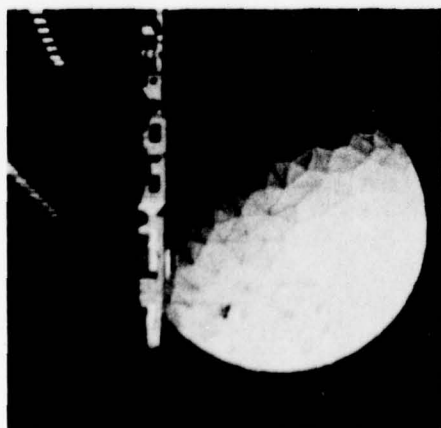
B2566 13



B2566 14



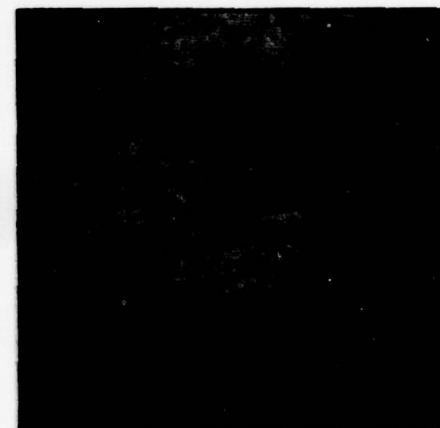
B2566 15



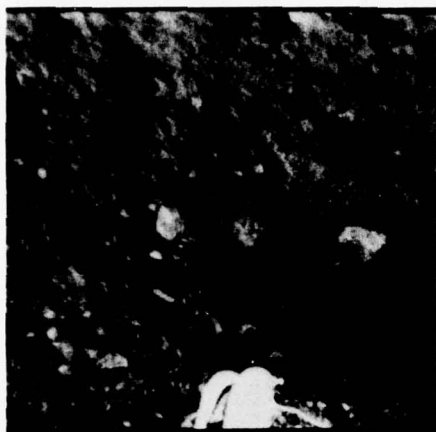
B2566 16



B2566 17



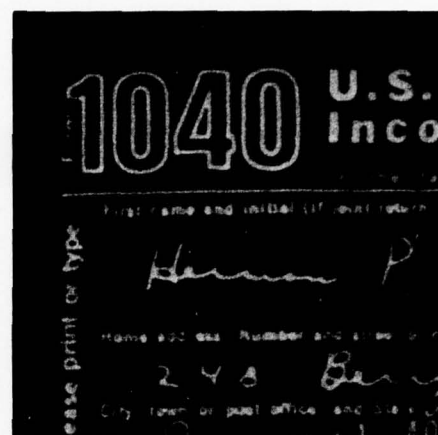
B2566 18



B2566 19



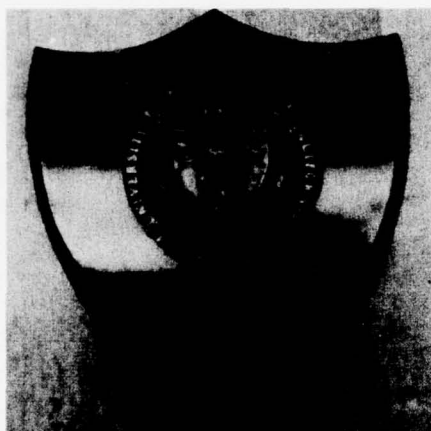
B2566 20



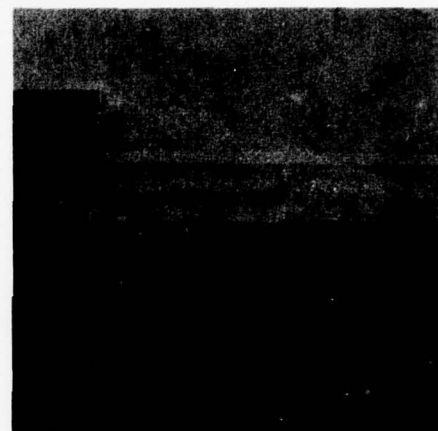
B2566 21



B2566 22



B2566 23



B2566 24



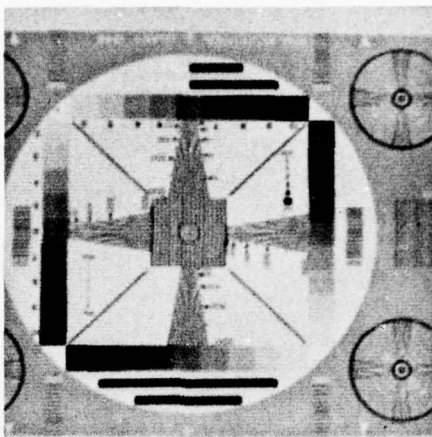
B2566 25



B2566 26



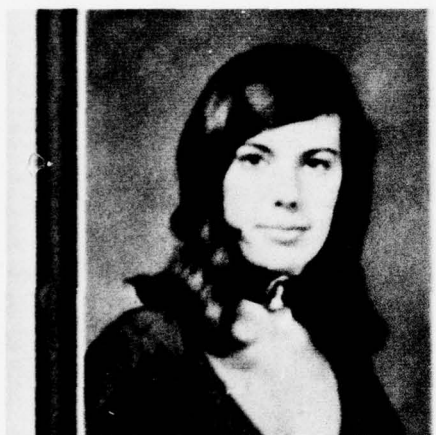
C2568 3



C2568 6



C2568 9



C2568 12



C2568 15



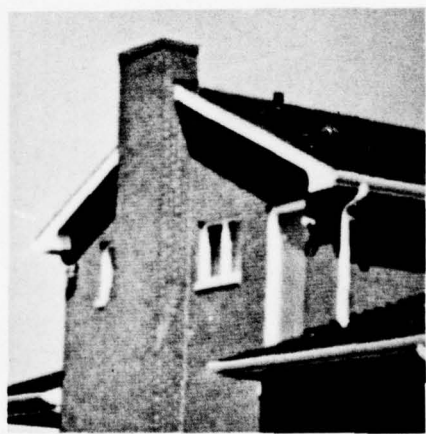
C2568 18



C2568 21



C2568 24



C2568 27

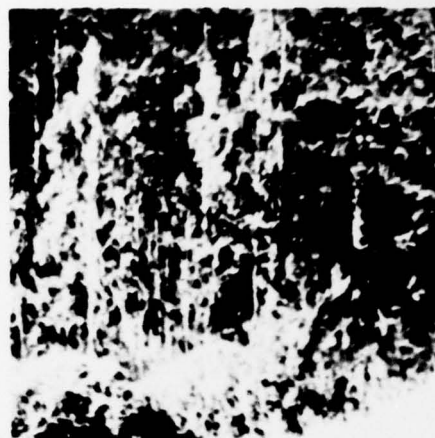




C2568 30



C2568 33



C2568 36



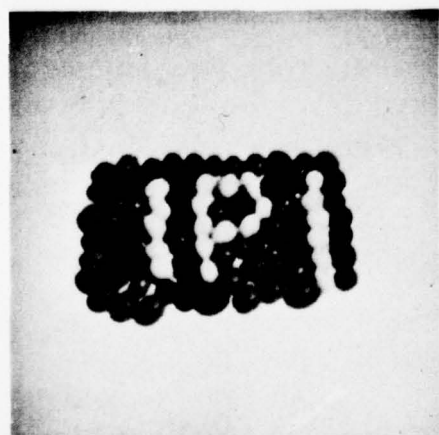
C2568 39



C2568 42



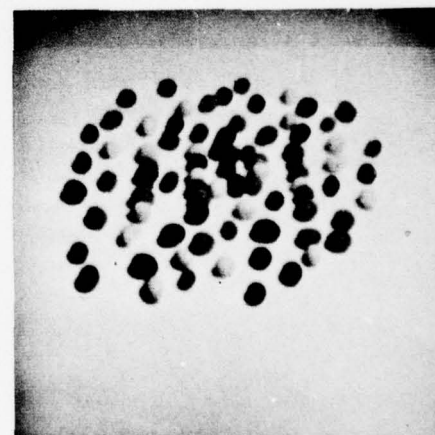
C2568 45



C2568 48



C2568 51



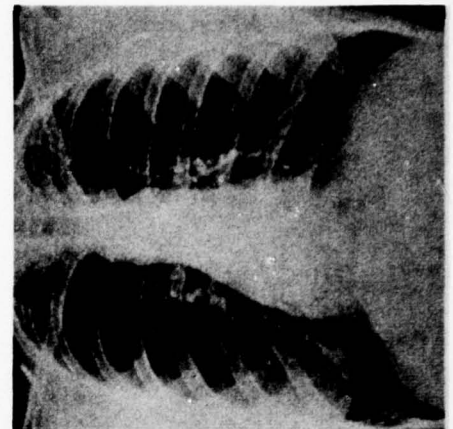
C2568 54



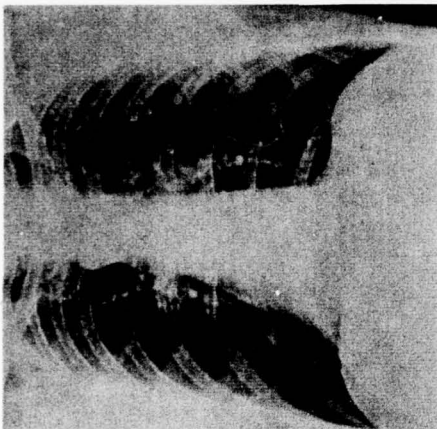
B2568 1



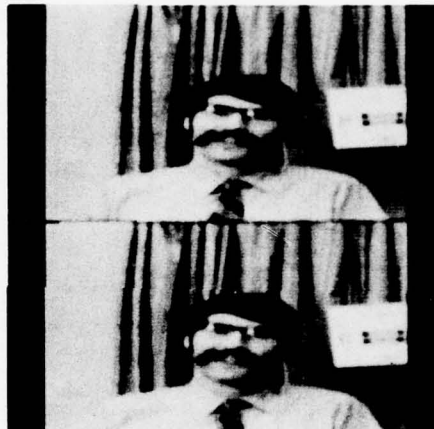
B2568 2



B2568 3



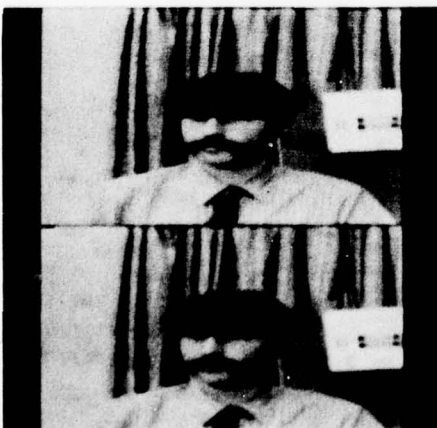
B2568 4



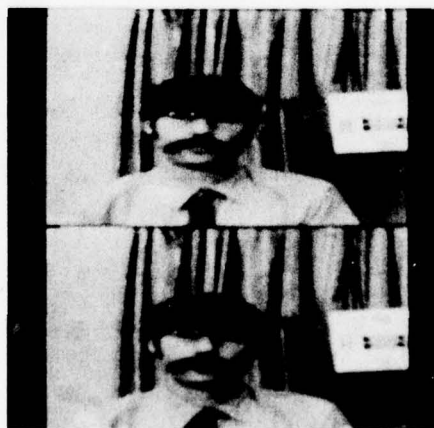
B2568 5



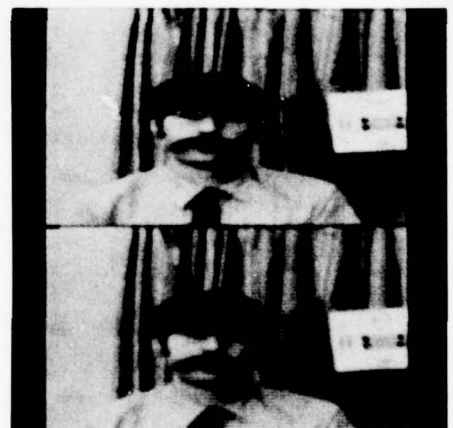
B2568 6



B2568 7



B2568 8



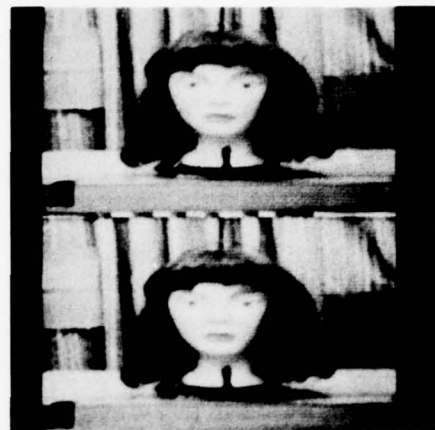
B2568 9



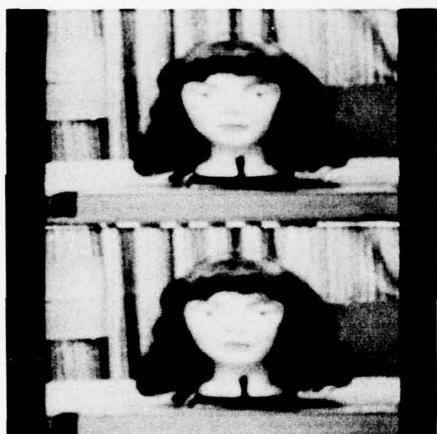
B2568 10



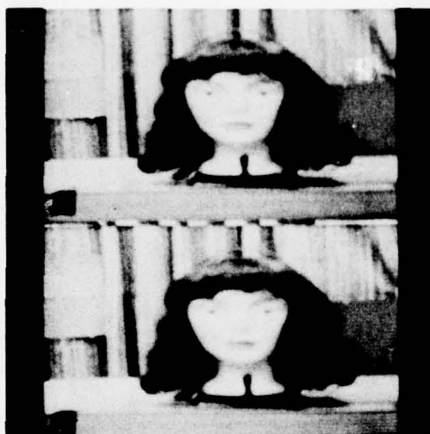
B2568 11



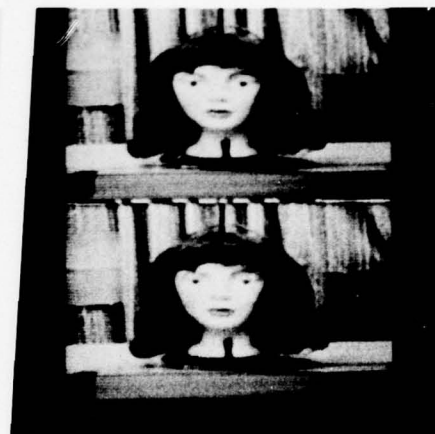
B2568 12



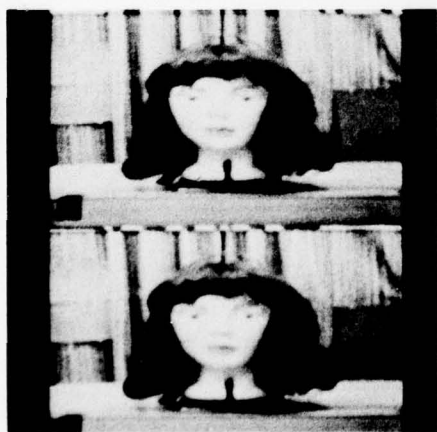
B2568 13



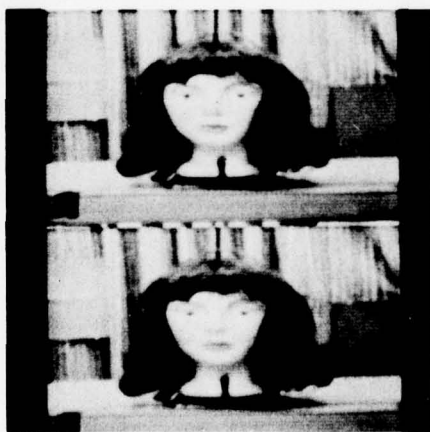
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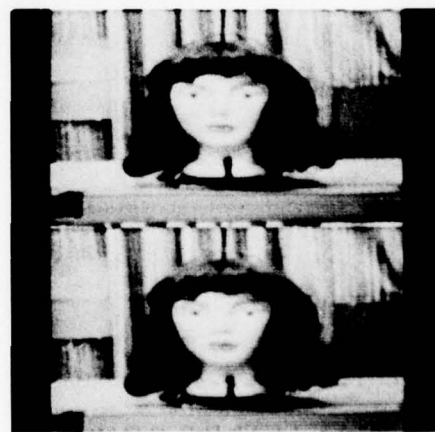
B2568 15



B2568 16

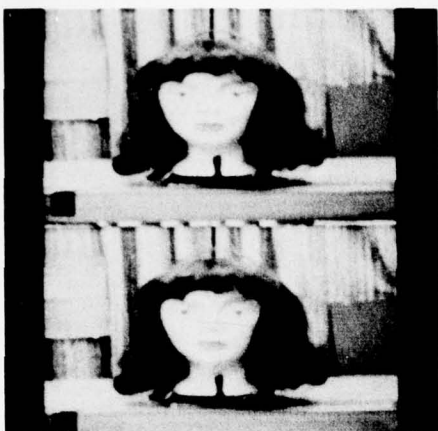


B2568 17

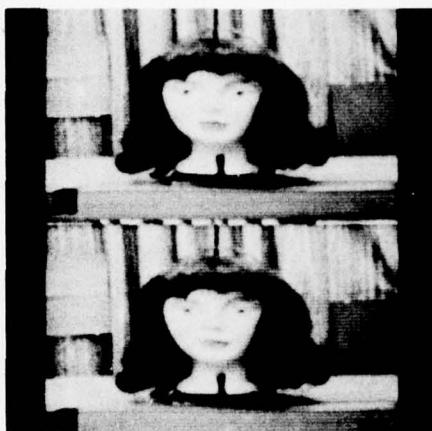


B2568 18

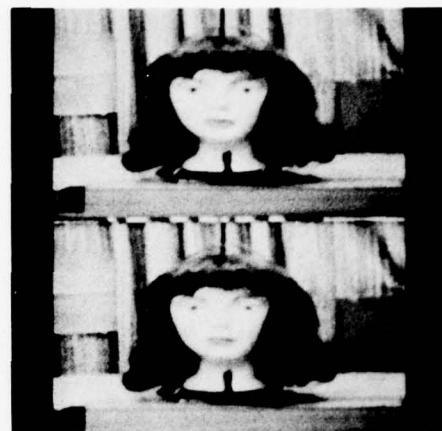




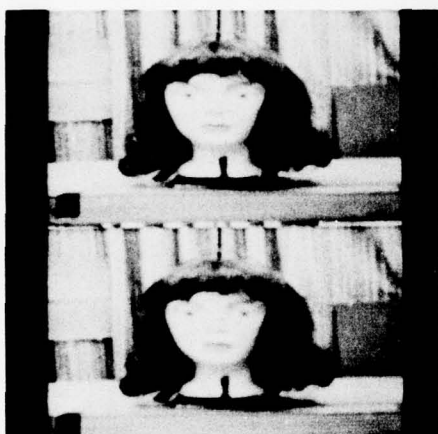
B2568 19



B2568 20



B2568 21



B2568 22



B2568 23



B2568 24

This typewritten passage was scanned and digitized into a 256x256 binary array for experiments in facimile coding using the digital image-processing facilities at USC. Both linear and nonlinear bandwidth reduction techniques will be attempted, including vector decomposition, binary reconstruction and phase only coding.

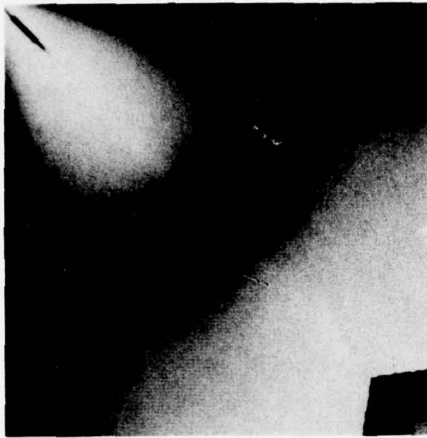
B2568 25



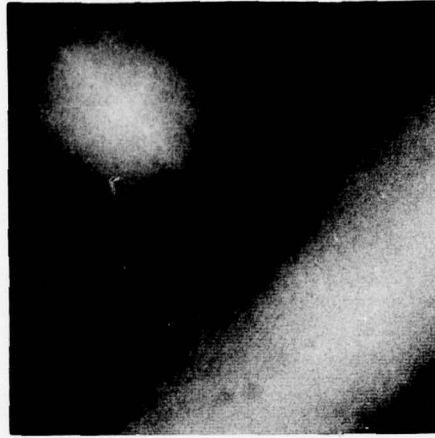
B2568 26



B2568 27



B2568 28



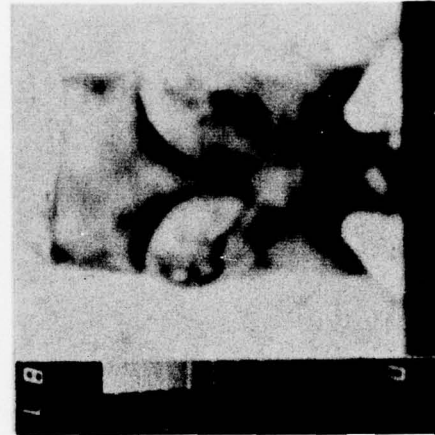
B2568 29



B2568 30



B2568 31



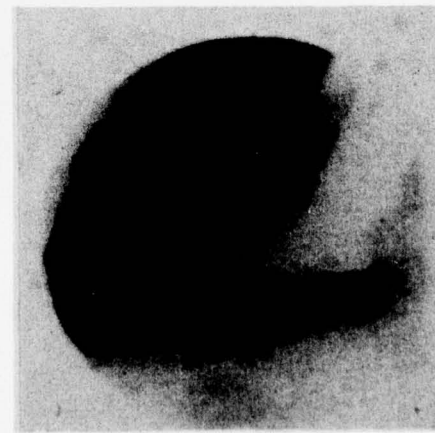
B2568 32



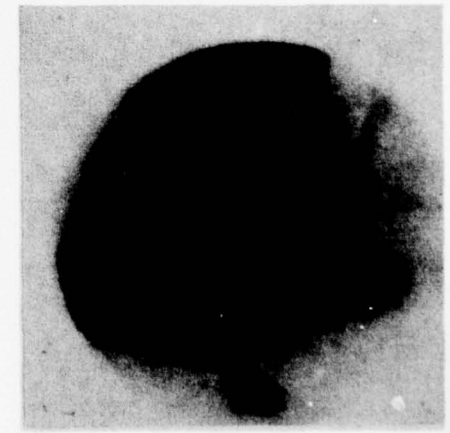
B2568 33



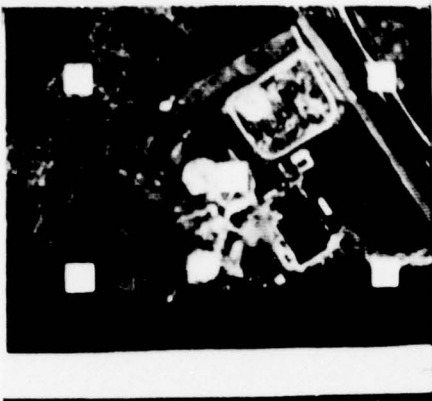
B2568 34



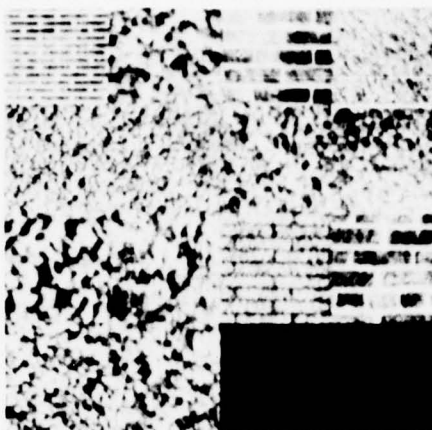
B2568 35



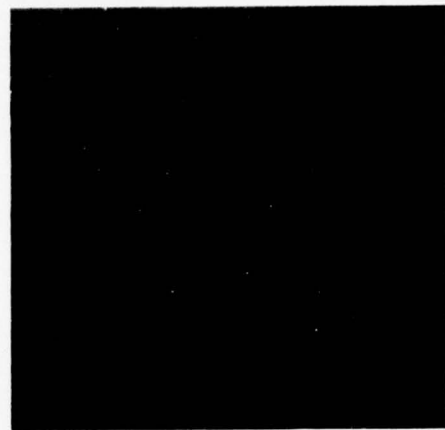
B2568 36



B2568 37



B2568 38



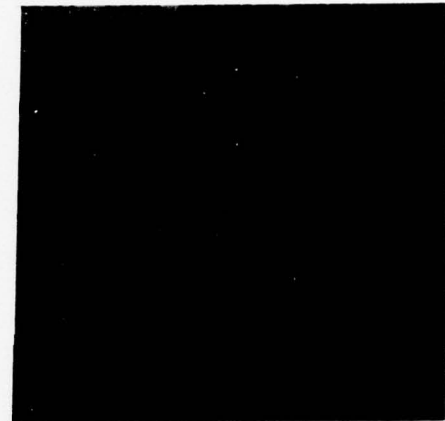
B2568 39



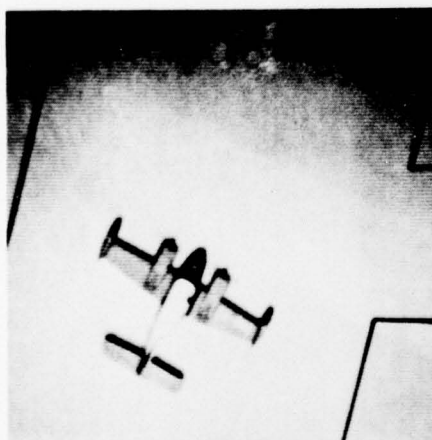
B2568 40



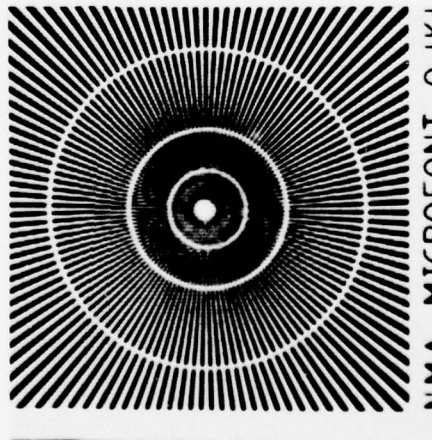
B2568 41



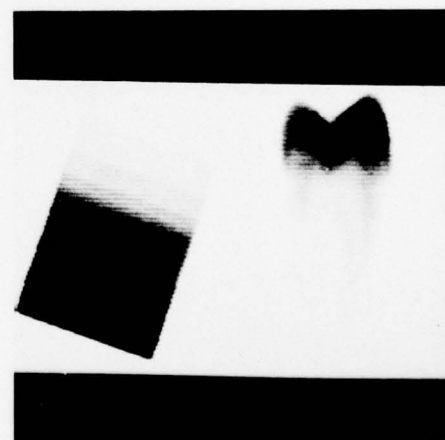
B2568 42



B2568 43

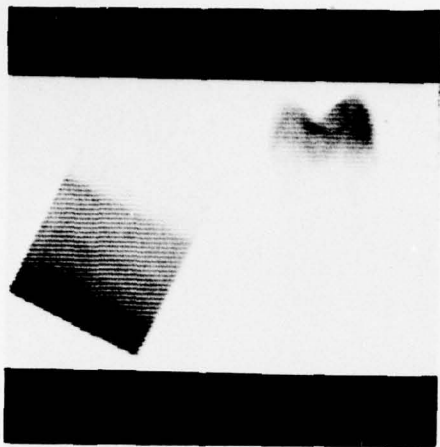


B2568 44

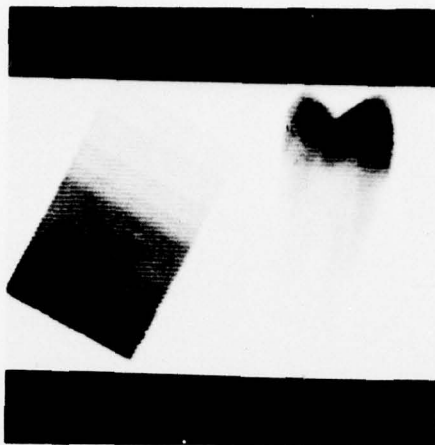


B2568 45





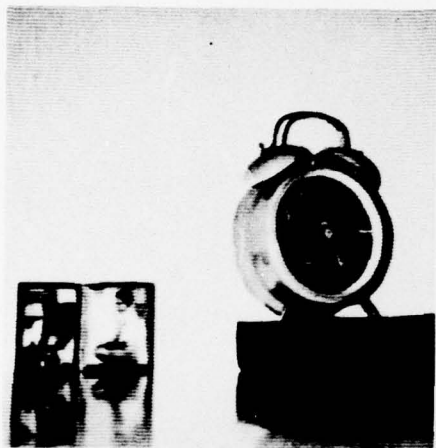
B2568 46



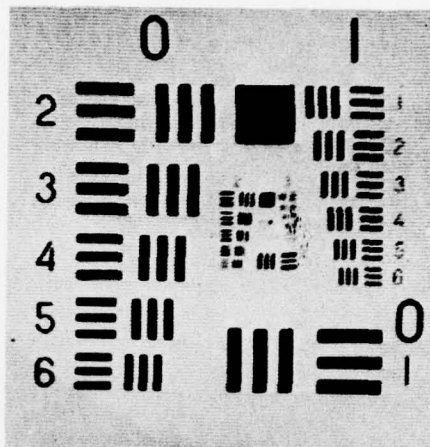
B2568 47



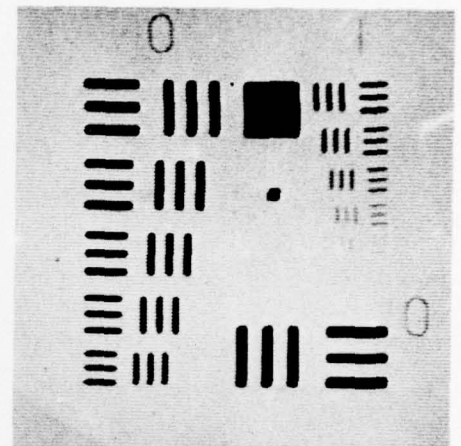
B2568 48



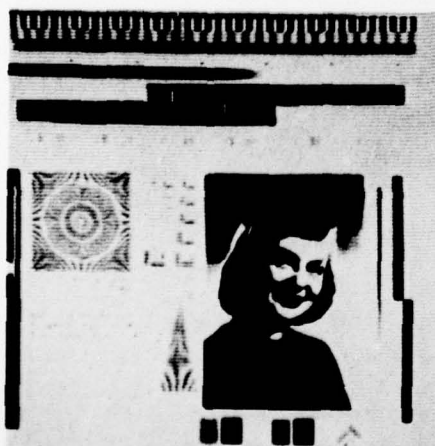
B2568 49



B2568 50



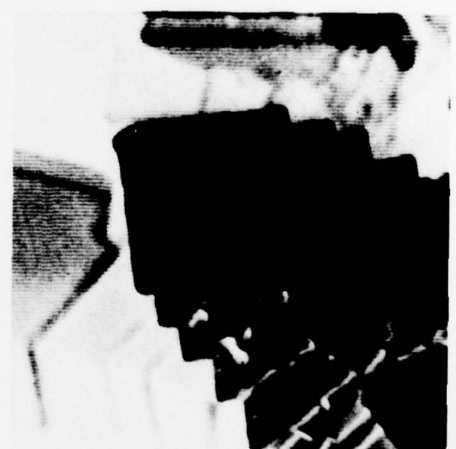
B2568 51



B2568 52



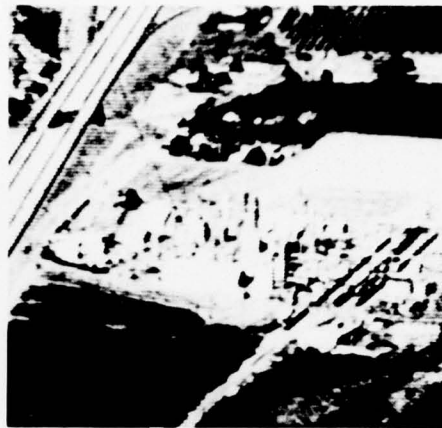
B2568 53



B2568 54



B2568 55



B2568 56



B2568 57



B2568 58



B2568 59



B2568 60



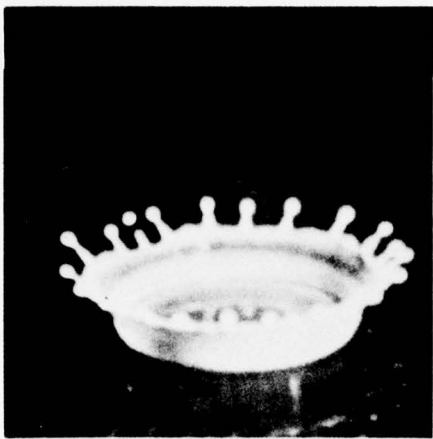
B2568 61



B2568 62



B2568 63



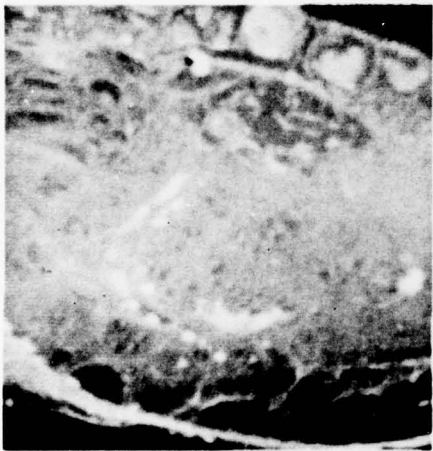
C5128 3



C5128 6



C5128 9



C5128 12



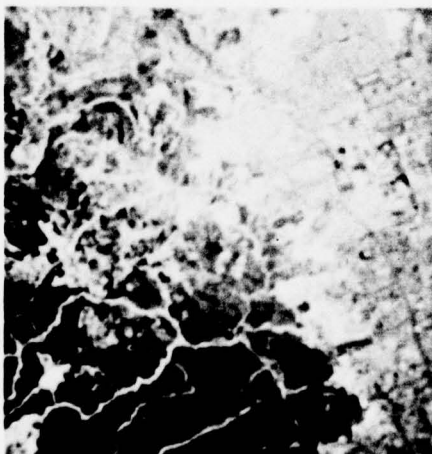
C5128 16



C5128 19



C5128 22



C5128 25

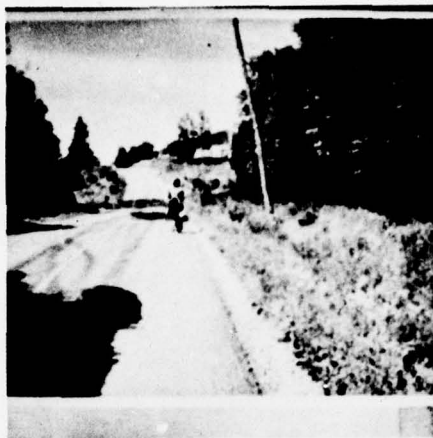


C5128 28





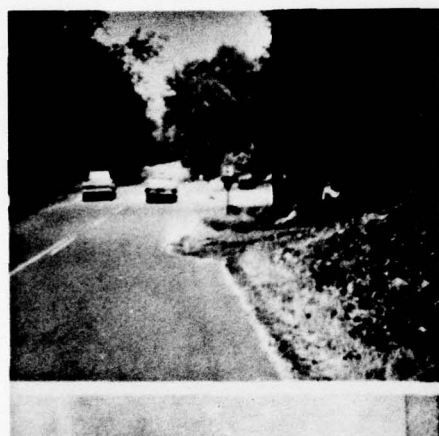
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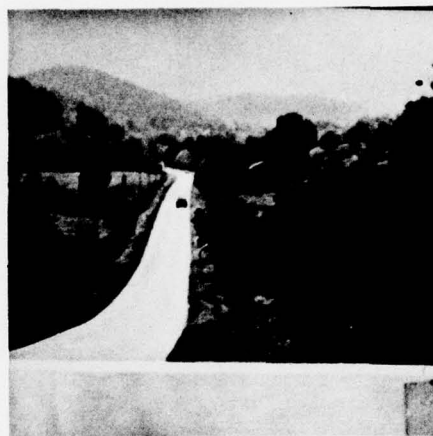
C5128 34



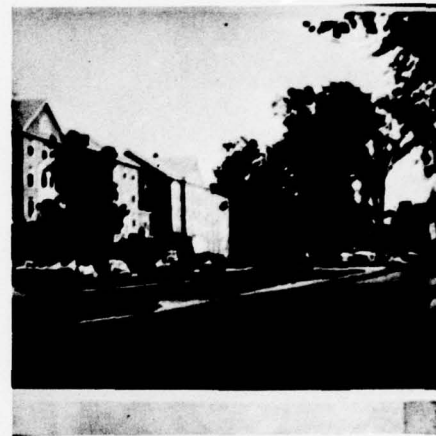
C5128 37



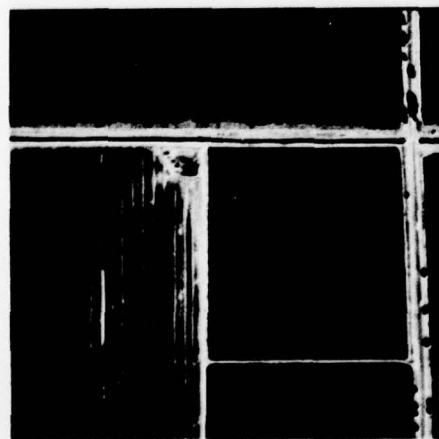
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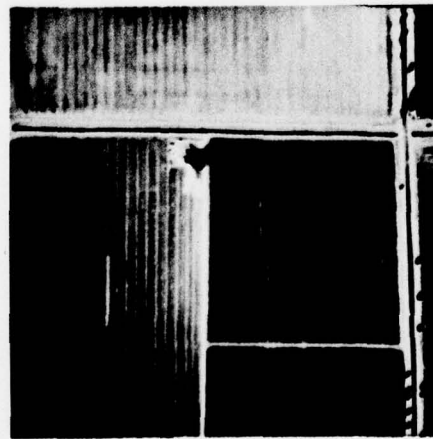
C5128 43



C5128 46



C5128 49



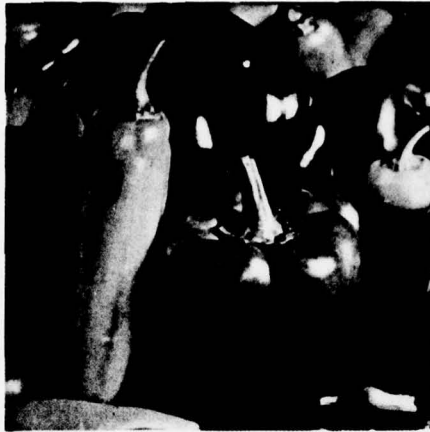
C5128 52



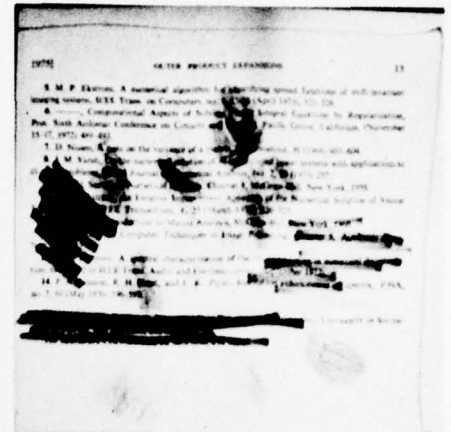
C5128 55



C5128 58



C5128 61



C5128 64



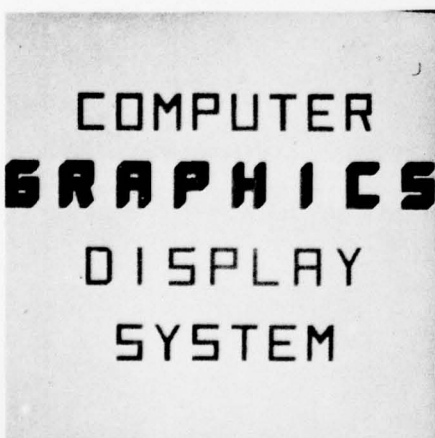
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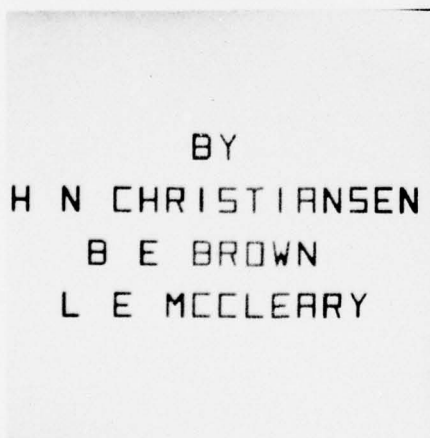
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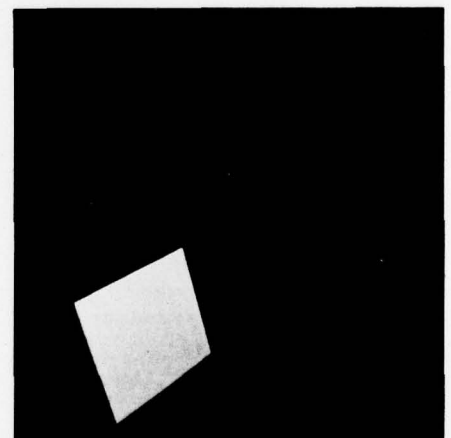
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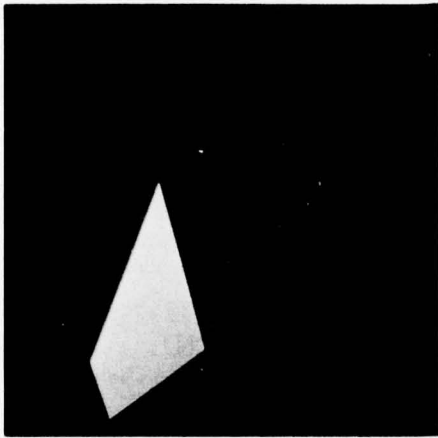
C5128 76



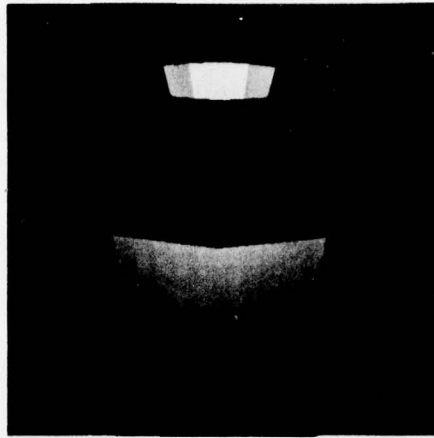
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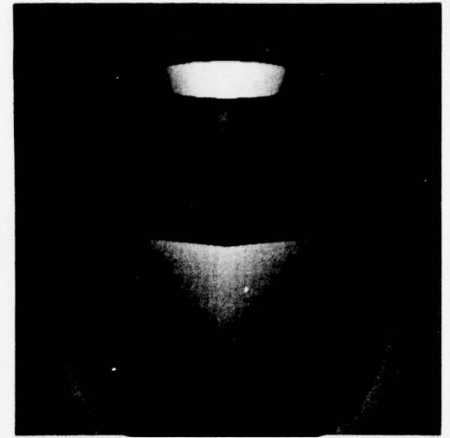
C5128 82



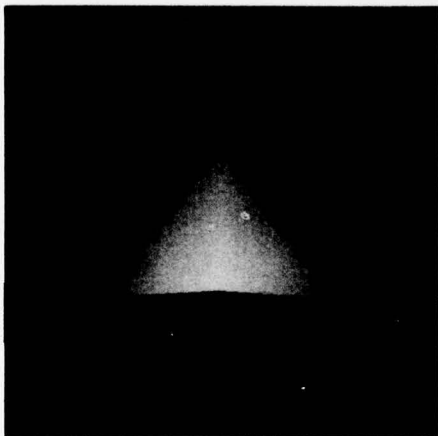
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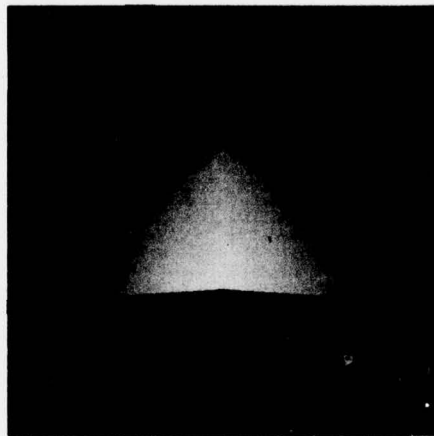
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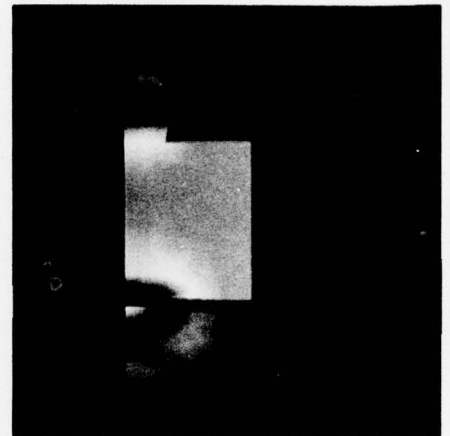
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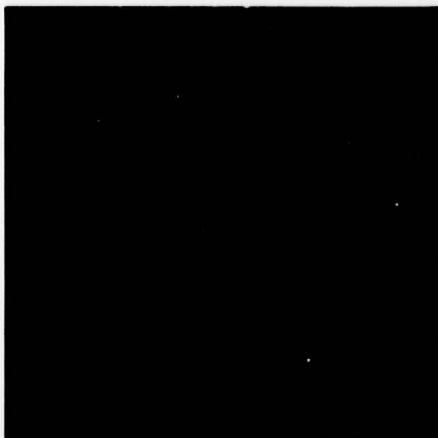
C5128 94



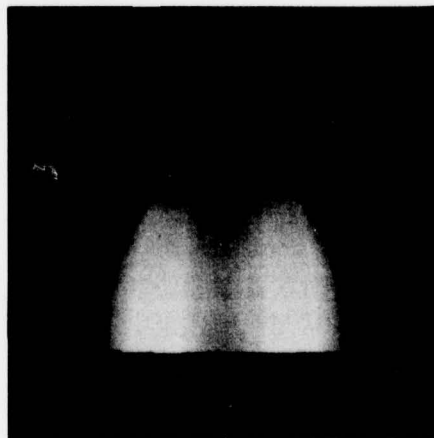
C5128 97



C5128 100



C5128 103



C5128 106

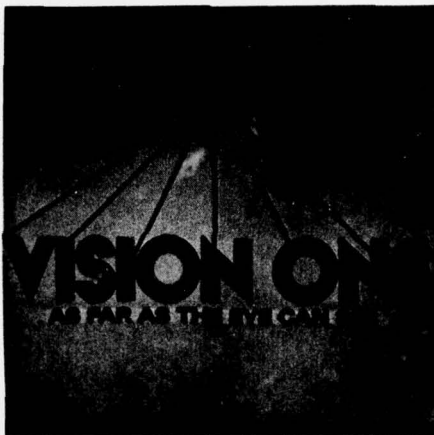


C5128 109





B5128 1



B5128 2

ing to which I believed an  
ing student could relate  
on. I was suffering from the  
ment I wanted to describe  
an engineering student. I  
actively become isolated  
a rest of the institution of  
learning by the very strict  
the engineering curriculum  
general attitudes about en-  
g. I found it difficult to  
a non-engineering aspects of  
iversity. As with the rest  
engineering class I had been  
removed from the climate of  
it cultivate during my fresh-  
d sophomore years and as  
it into the total technical  
I space of the engineering.  
With the arrival of my  
year I found myself not  
I with taking a philosophy  
rational relations course  
of sociology. I was studying  
one and amplifiers. In  
d literature it was digital.  
The space around me was  
technical. And as I be-  
customed to this totality  
using my free electives to  
one and more engineering  
instead of a change of  
contingent activities. Once in awhile  
he may take on a sporting event or  
a movie. But most of the time he  
amuses himself with study, a good  
technical discussion, or by tinkering  
with some gadget.  
By his senior year, what the stu-  
dent engineer thinks, dreams,  
locates, talks and does is in engi-  
neering. Thought has shifted from  
the principles behind protests, the  
ultimate of man's existence, or the  
effects of slums on their occupants  
to symbols, equations, and systems.  
The abstract of thought evolves to  
the specifics in theory. The  
survival of existence is transformed  
into worries about the boundaries  
conditions of a problem. . . . social  
concern takes the form of making  
sure that your lab neighbor doesn't  
run your experiment. It's the lab,  
not the world. (Rumors have it  
that the reason engineers are not  
included in the Dean's List printing  
in the school newspaper every  
semester is because the course ma-  
terial covered is too technically  
oriented and therefore cannot be  
compared with liberal arts studies.  
Some LAS people have even been  
heard to say that engineers are

B5128 3



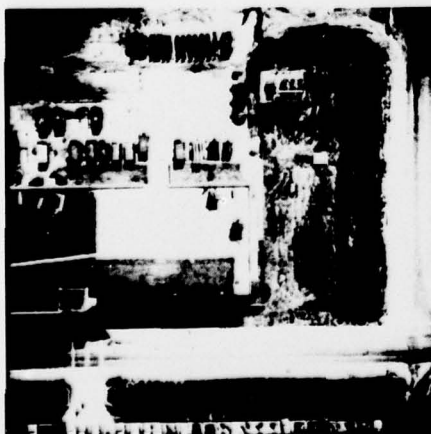
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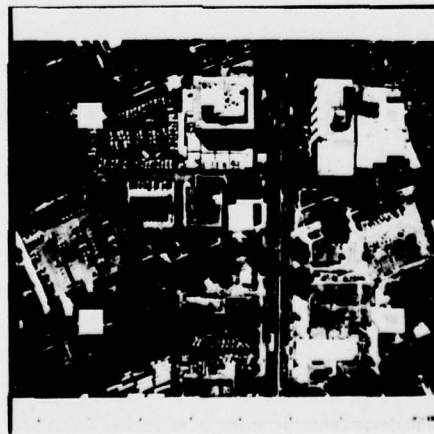
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B5128 6



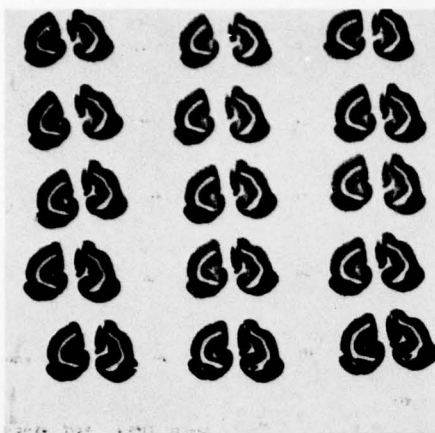
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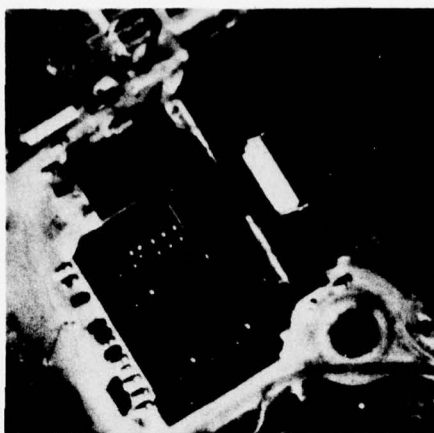
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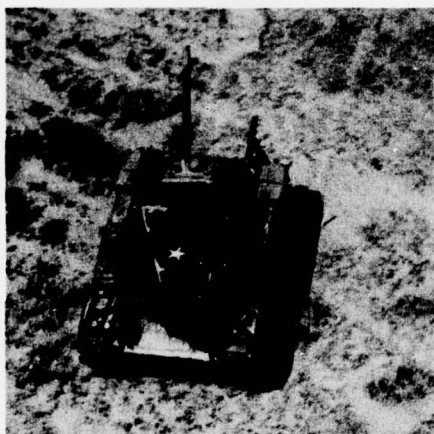
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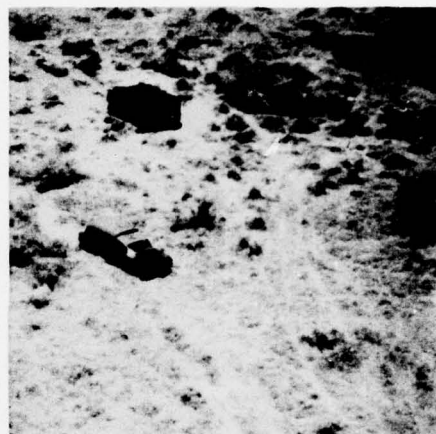
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B5128 13



B5128 14



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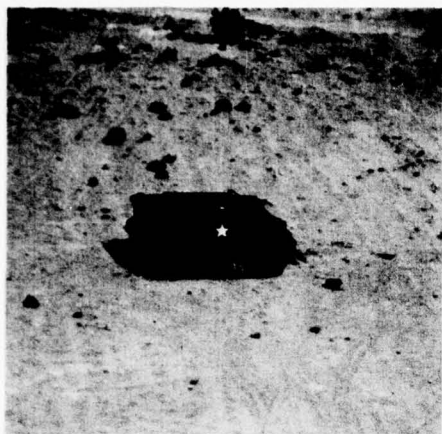
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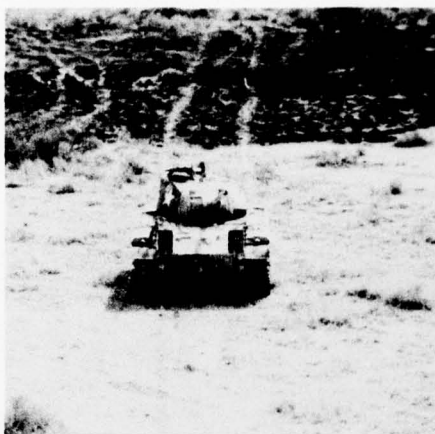
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B5128 18



B5128 19



B5128 20



B5128 21



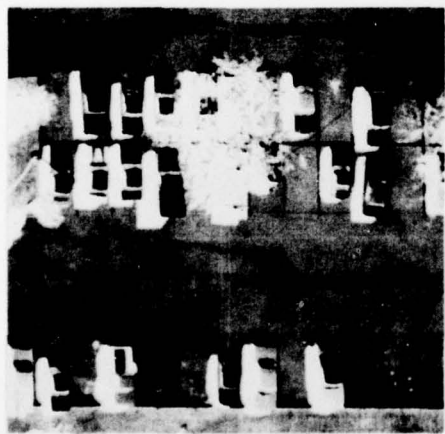
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B5128 23



B5128 24



B5128 25

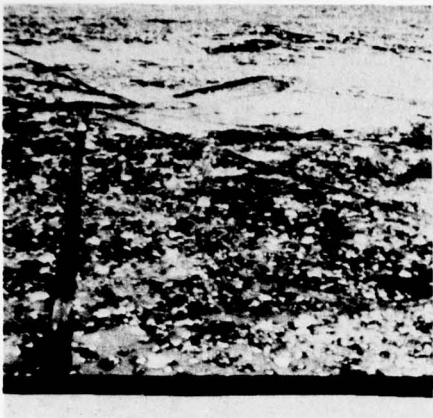


B5128 26



B5128 27

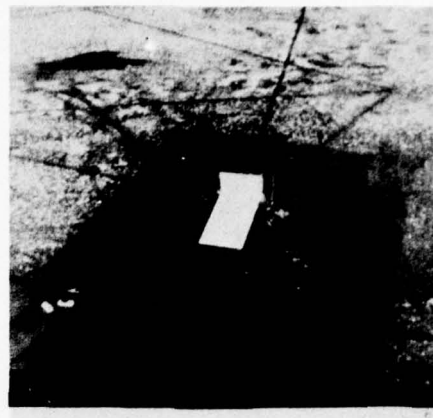




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B5128 29



B5128 30



B5128 31



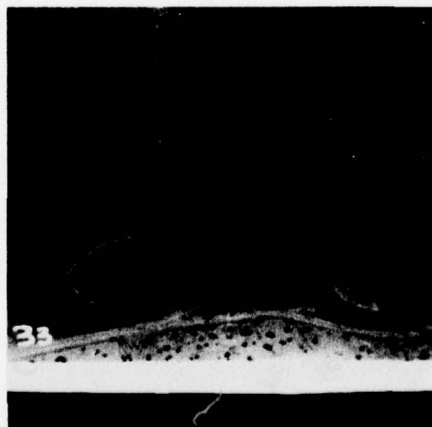
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B5128 33



B5128 34



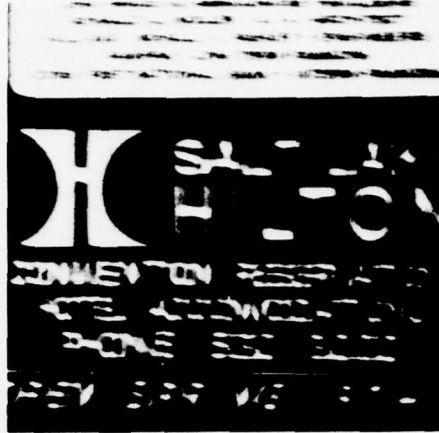
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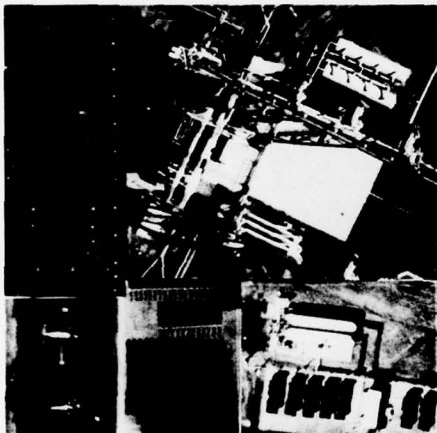
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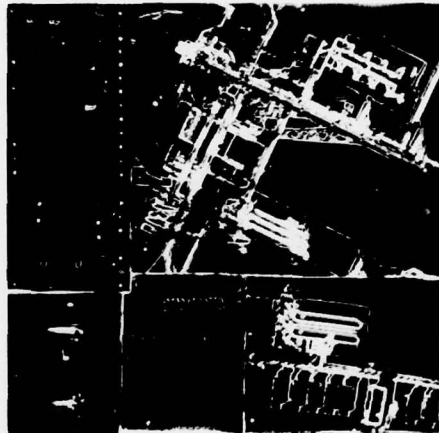
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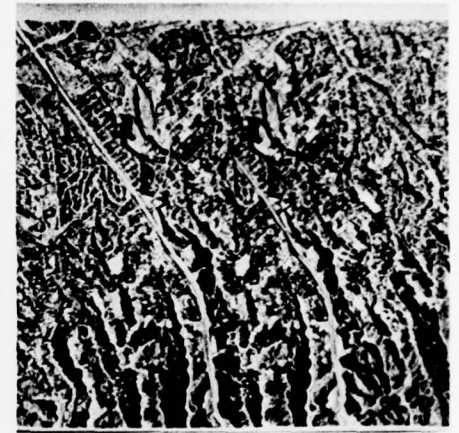
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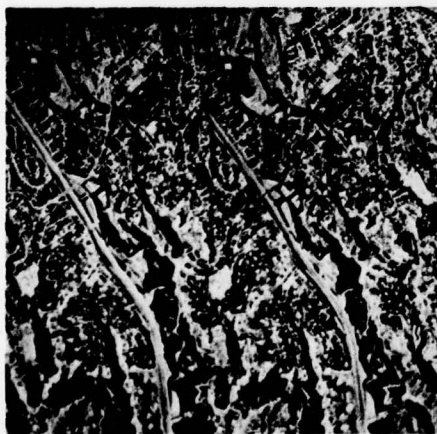
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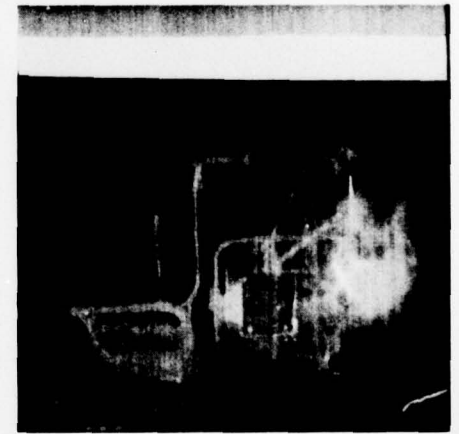
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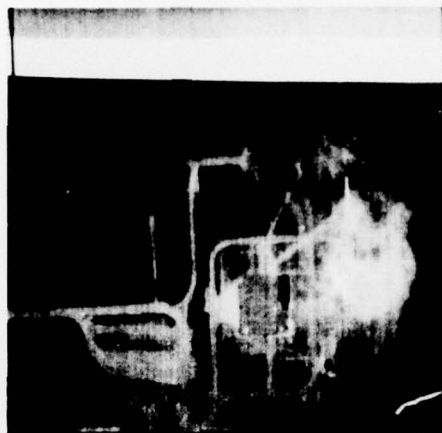
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B5128 45



B5128 46



B5128 47



B5128 48



B5128 49



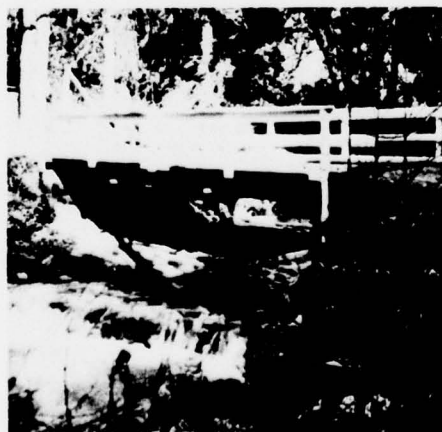
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B5128 51



B5128 52

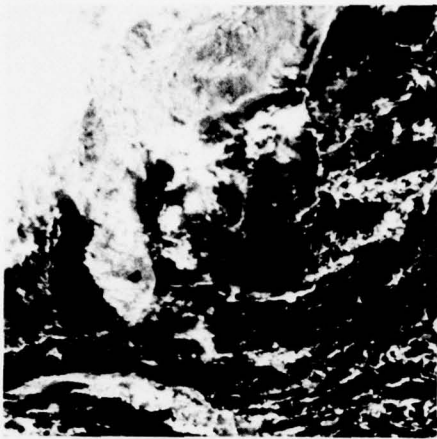


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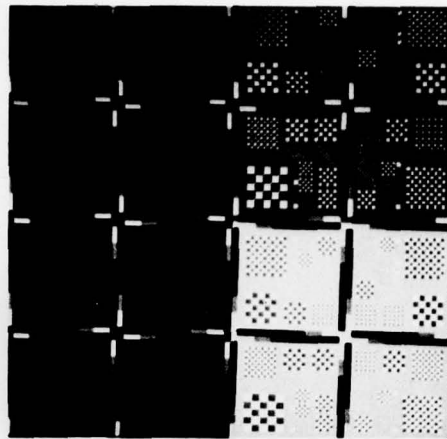


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B10248 1



B10248 2



B10248 3



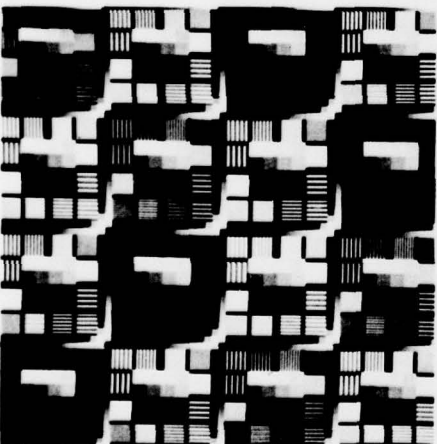
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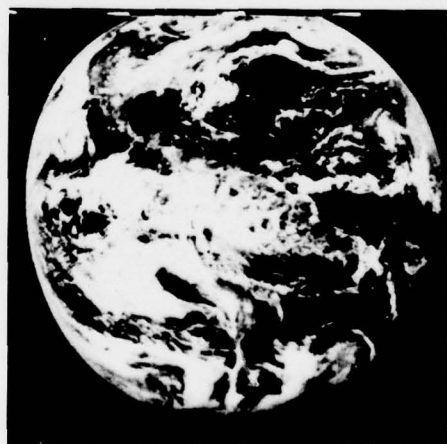
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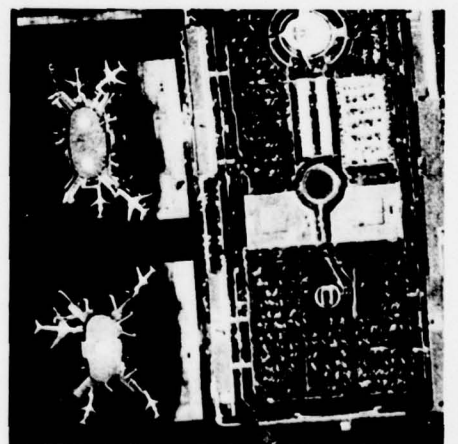
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B10248 7



B10248 8



B10248 9